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TAKASHI HARA

The Commoner of Japan, the Leader of the Liberals, Advocate of Peace and Co-operation, has been stricken down by the dagger of the assassin, at a time when the nation is passing through the greatest crisis in its long history. Quick to sense the change that came over the world with the defeat of Germany, the masterful leader of the Seiyukai had the power to impose the will of his party upon the militarists and shape the policy of Japan along lines harmonizing with the trend of the times. Supported by the full weight of the great commercial and financial interests of the empire, Premier Hara in guiding the Ship of State through the diplomatic ordeals of post bellum days, has given evidence of an intense desire to work in cordial accord with America by entering the Consortium on an equal basis with the other Powers. At all times he demonstrated a sincere willingness to bridge the gap across the Pacific and clasp the hand of America in hearty friendship and cooperate with her for the solution of Pacific problems. Under his able and far-seeing leadership, the Japanese Delegation has proceeded to Washington prepared to make further and more important concessions in order to demonstrate anew Japan's true spirit of friendship for the United States and China.

His death comes at a moment fraught with grave danger to the establishment of permanent principles for the guidance of future Pacific diplomacy. Although there are many in Japan who believe that he was the one statesman who wielded the power to dominate the situation and pull the empire through the present crisis, the forward movement of the past three years has carried Japan so far along the path of true popular government that his death will hasten rather than retard its ultimate success. Japan will swing into line with the other great liberal nations of the world. Concede unto Japan the same rights of self-preservation enjoyed by all other nations, and her people can be depended upon to relegate the militarists into a subordinate position and assume gladly their share of the burdens for advancing world peace and good understanding. If the Pacific Conference hews to these lines, Premier Hara will not have died in vain. His work will live. When the princes, field-marshals and other leaders of present-day Japan are forgotten, the name of TAKASHI HARA will go thundering down the pages of history as one of the world's great figures, the martyr whose death brought understanding and peace to the nations of the Pacific.

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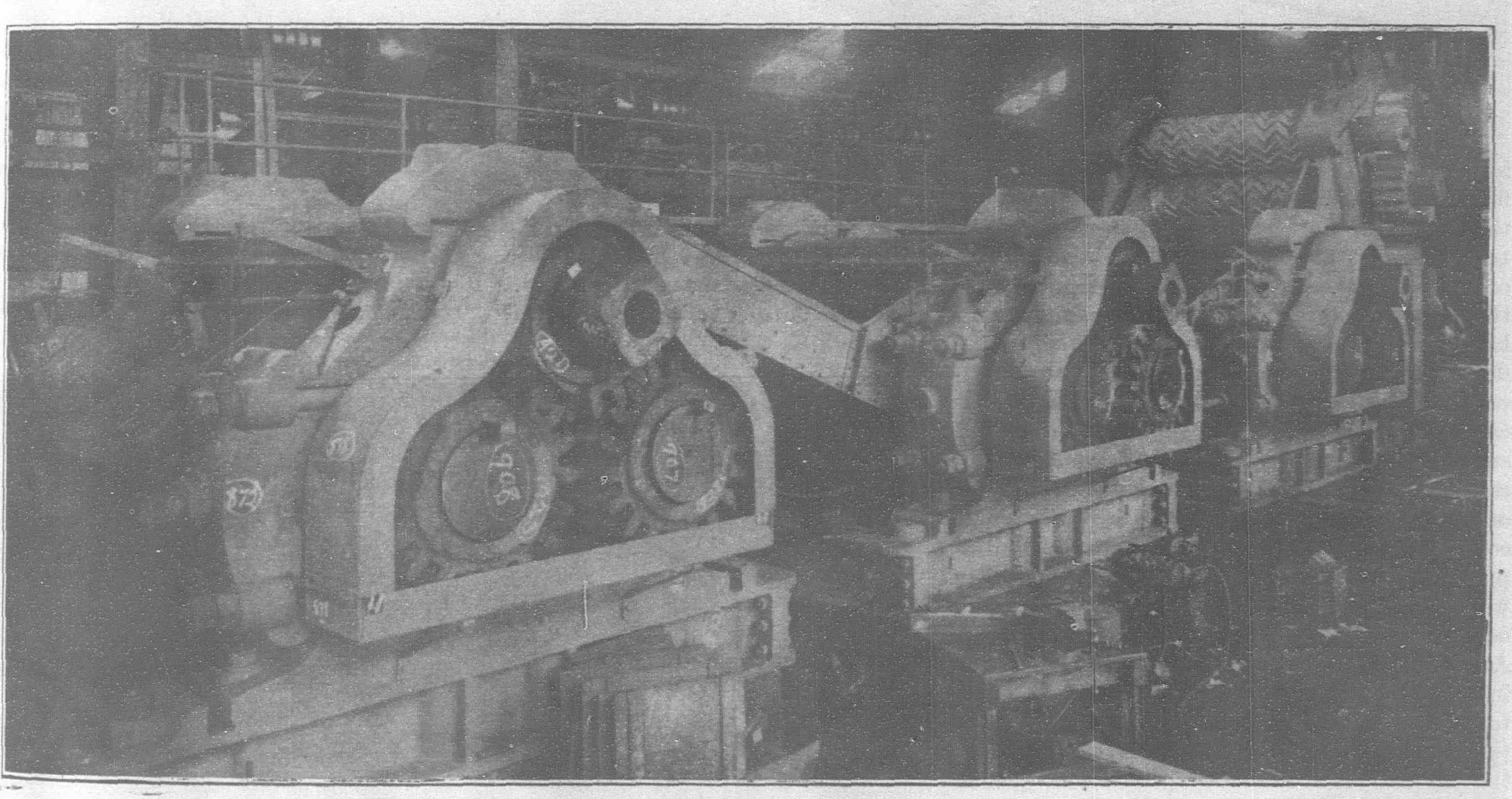
The Philippine Sugar Industry

By GEORGE H. FAIRCHILD, Manila

ACCORDING to authoritative records, sugar was exported from the Philippines to the United States as early as 1795, United States statistics for that year showing that some 132 long tons of Philippine sugar were imported.

Some of the cultivated varieties of sugar cane in the Philippine Islands are presumed to have been introduced from China, and it is possible that others are indigenous to the islands. The methods adopted in the native mills for the manufacture of muscovado sugar also came from China.

Up to the middle of the nineteenth century, the production of sugar cane was confined largely to the provinces in Luzon nearby Manila, but following an increased demand from Europe for sugar during the Crimean War interest in the industry was greatly stimulated and the development of the industry extended into the Visayas, and Negros Occidental became the largest cane-producing sector in the Philippines. From that time on up to about the end of the Spanish administration, the industry shows a steady development, the banner year being 1893, when approximately 300,000 tons of sugar were exported.

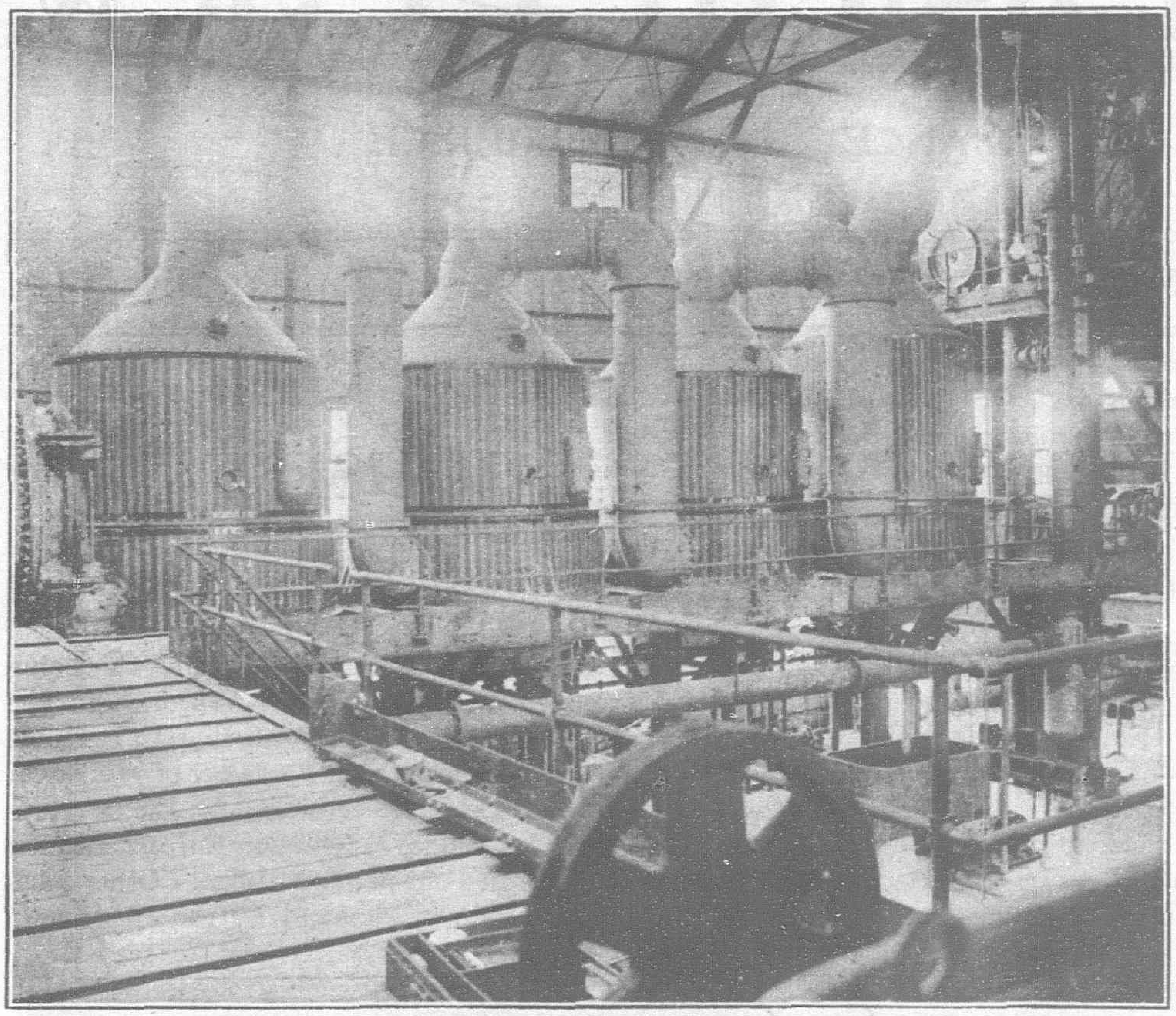


THE FIRST MODERN SUGAR MILL ERECTED IN THE PHILIPPINES

A nine roller mill and crusher, consisting of three 36" by 84", 3 roller mills and one 30" by 84" Krajewski crusher, made by the Honolulu Iron Works for the Mindoro Sugar Company

All this sugar was what is known as muscovado sugar, this being the quality of cane sugar in general production throughout the world at that time. Towards the end of the nineteenth century, however, refiners began to insist upon a higher quality of raw sugar from cane than muscovados. This was occasioned by the development to a high degree of the beet sugar industry in Europe, and the fact that beet sugar could be turned out in refined form. Other cane-producing countries met the refiners' demand by the erection of more up-to-date mills, but the Philippine Islands, for reasons which will be given, continued until within the past ten years to use their native mills. But the advantages of modern sugar centrals have now been brought home to the planters. There are at present twenty in operation and eight under construction or planned for immediate development, and it will not be long before the ratio of centrifugals to muscovados is reversed.

The political situation of the country towards the end of the nineteenth century undoubtedly retarded the development of the sugar industry. During that period, there was much political unrest, which culminated in the insurrection against Spanish sovereignty; later on the American occupation of the islands,



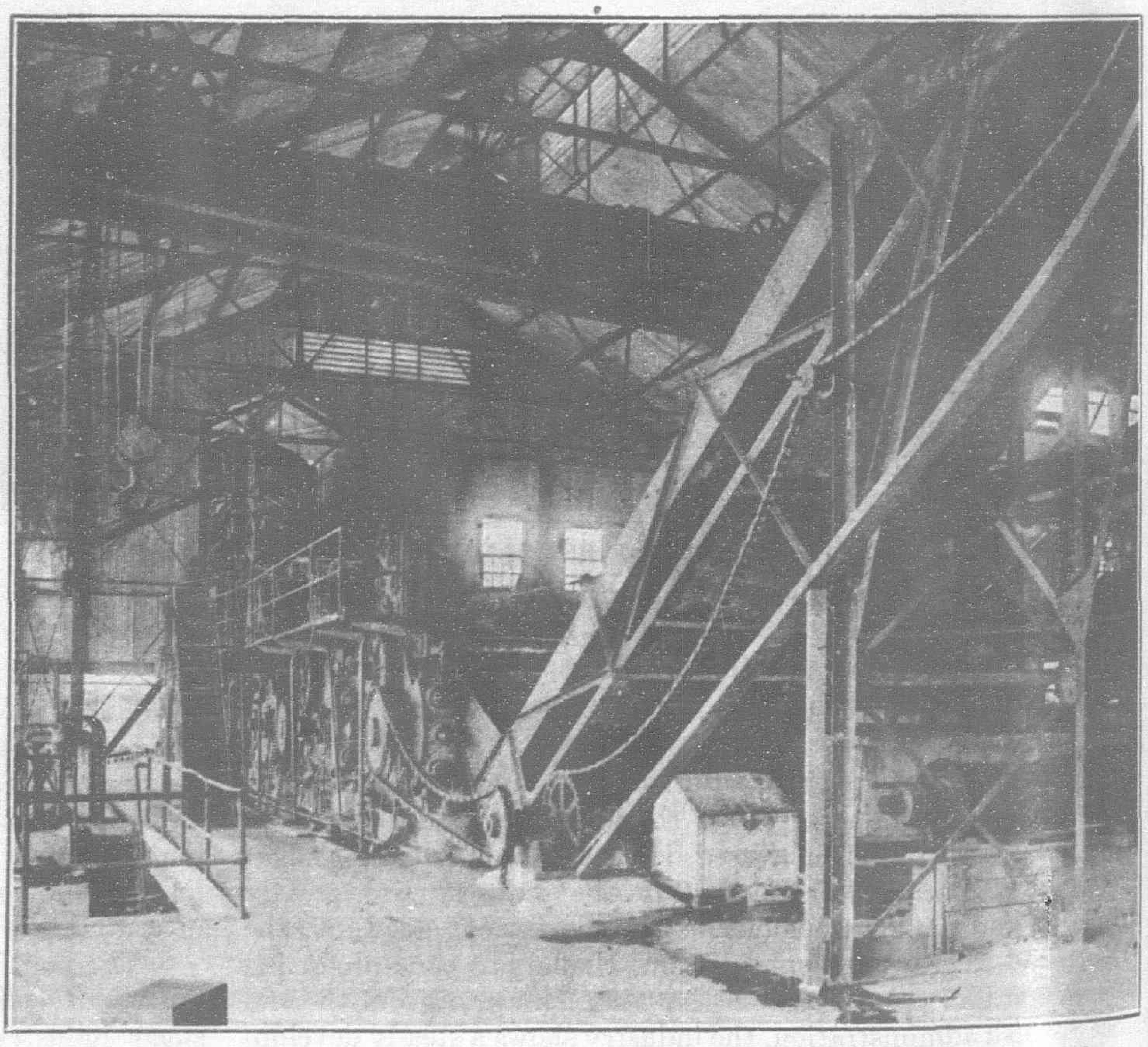
Quadruple Effect of the San Carlos Central Factory, Philippine Islands, erected by the Honolulu Iron Works

followed by a period of disturbances until law and order were finally established. And as if political troubles were not enough, there came an epidemic of rinderpest, which is said to have destroyed 80 per cent. of the work animals in the islands. In view of the political uncertainties of the time, it is not surprising that there was no influx of much-needed capital to modernize and develop the sugar industry in keeping with the development that took place in other cane-producing countries; and following such a calamity as the rinderpest epidemic, one is not surprised to find production considerably reduced. During the first ten years of American occupation, as a result of these unfavorable conditions, the exports of sugar from the Philippines averaged only about one-half what they were during the last ten years of Spanish occupation. However, the passage of the Payne-Aldrich Bill in 1909 providing for free entry into United States markets of up to 300,000 tons of Philippine sugars* and, a little later, the introduction of modern sugar centrals into the industry, stimulated production, which increased considerably, so much so that the year 1916 showed exports of sugar amounting to about 375,000 tons of 2,000-lbs., the largest in the history of the sugar industry of the Philippines. This favorable showing was mostly due to an exceptionally favorable growing and harvesting season. Since that time production has decreased about 40 per cent. due partly to unfavorable weather conditions, but to a greater extent to adverse shipping conditions arising out of the scarcity of tonnage occasioned by the war and the high freight rates for such tonnage as was available. The lack of tonnage and high freight rates prevented sugar from reaching the United States and European markets, and stocks accumulated to such an extent that the situation became critical, until, through influence exerted in Washington, arrangements were made to ship a large quantity of the accumulated stocks to United States.

But with the termination of the European war, the sugar industry in the Philippines passed rapidly from its critical stage into one of unprecedented prosperity. The effects of the war upon the beet sugar industry in Europe have been drastic; production decreased from 8,000,000 tons in 1913/14 to 3,600,000 in 1918/19. While Cuba and some other cane-producing countries materially increased their production during the war-period, the total world production of sugar decreased from 18,700,000 tons in 1913/14 to 16,300,000 tons in 1918/19.

Upon the cessation of hostilities, the world found itself facing a serious shortage of sugar. Large purchases of Javan sugar by European countries in the beginning of 1919 left China and Japan looking around for sugar to meet their requirements, and naturally their attentions turned to the Philippines. Then began the era of high prices, unprecedented in the history of the sugar industry in the Philippines. Prices rose steadily from P. 7 per picul for No. 1 sugars in the beginning of the year to P. 30 per picul by the middle of the year, and centrifugals advanced in the same period from P. 11 per picul to P. 34.

The future of the sugar industry in the Philippines holds out much promise. Throughout the world there is an increased demand for sugar. It is estimated that the world could now well take care of at least 20,000,000 tons of sugar. Not only therefore



Nine Roller Mill and Crusher on the San Carlos Central Factory, erected by the Honolulu Iron Works

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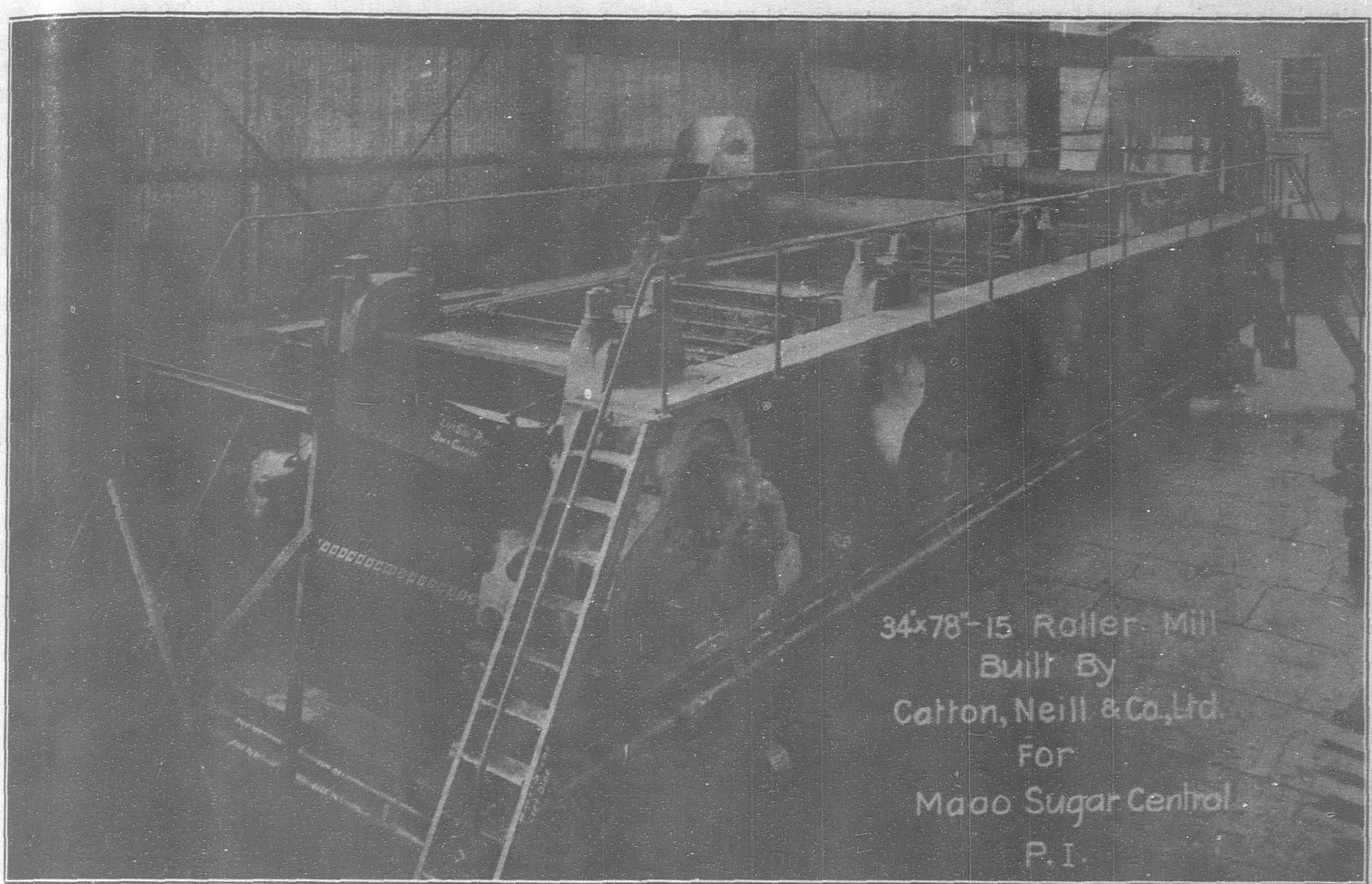
*This limit was removed under the Jones Bill, so that now there is no limit to the quantity of Philippine sugars that may be admitted into United States duty free.



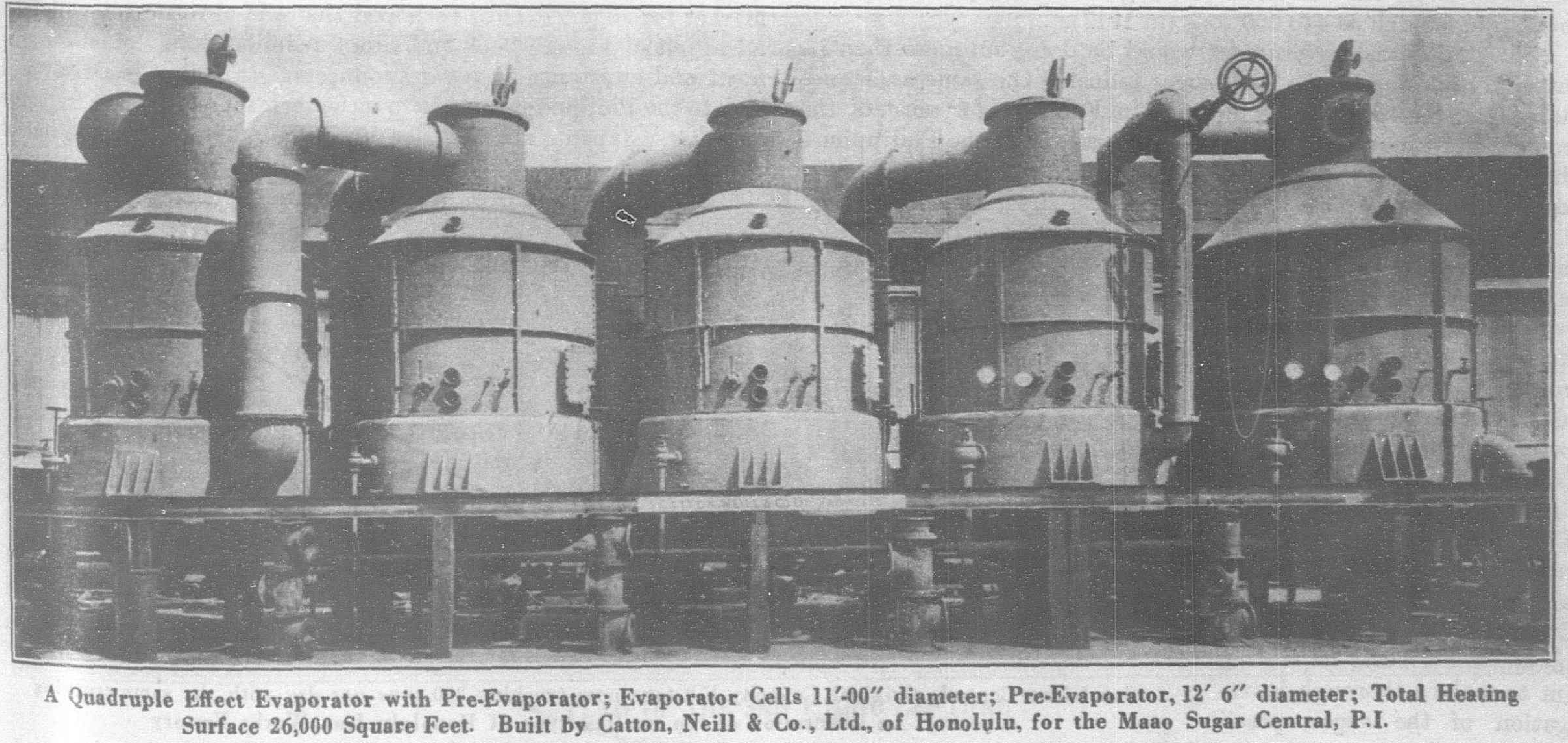
A 34" by 78" Fifteen Roller Mill Built by Catton, Neill & Co., Ltd., for the Maao Sugar Central, P.I.

has the world to make good a deficit of 2,000,000 tons on pre-war production, but it has also to provide an additional 2,000,000 tons to supply its needs, and there is no satisfactory substitute in sight. In other words, it has to increase its production by 4,000,000 tons.

Here is an opportunity for Philippine cane producers to exert themselves, and I shall touch briefly on what, in my opinion, are the best means to increase production in these islands.

II

Possibly the Philippines could find its best lesson in increasing its sugar production from Japan's policy in rehabilitating and developing the sugar industry in Formosa. When Japan acquired Formosa in 1894/5 as a result of the Chino-Japanese war, the opportunity was made available to her to solve an economic problem which had been causing her considerable anxiety, viz., to provide some means within her own territory of meeting the



A Quadruple Effect Evaporator with Pre-Evaporator; Evaporator Cells 11'-00" diameter; Pre-Evaporator, 12' 6" diameter; Total Heating Surface 26,000 Square Feet. Built by Catton, Neill & Co., Ltd., of Honolulu, for the Maao Sugar Central, P.I.

continually increasing demand for sugar. The consumption of sugar in Japan at that time amounted to 300,000 tons, of which Japan produced only 65,000 tons, leaving 235,000 tons to be imported. Japan lost no time in taking advantage of this opportunity, and the fact that production in Formosa has been increased so tremendously is generally admitted to be due to the encouragement received from the government. When Japan took over Formosa, the production had fallen to 30,000 tons, but by a systematic study of conditions carried on under the direction of the government, production has gone up to as high as 440,000 tons (in 1917).

Vacuum Pans, Built by Catton, Neill & Co., Ltd. for the Maao Central, P.I.

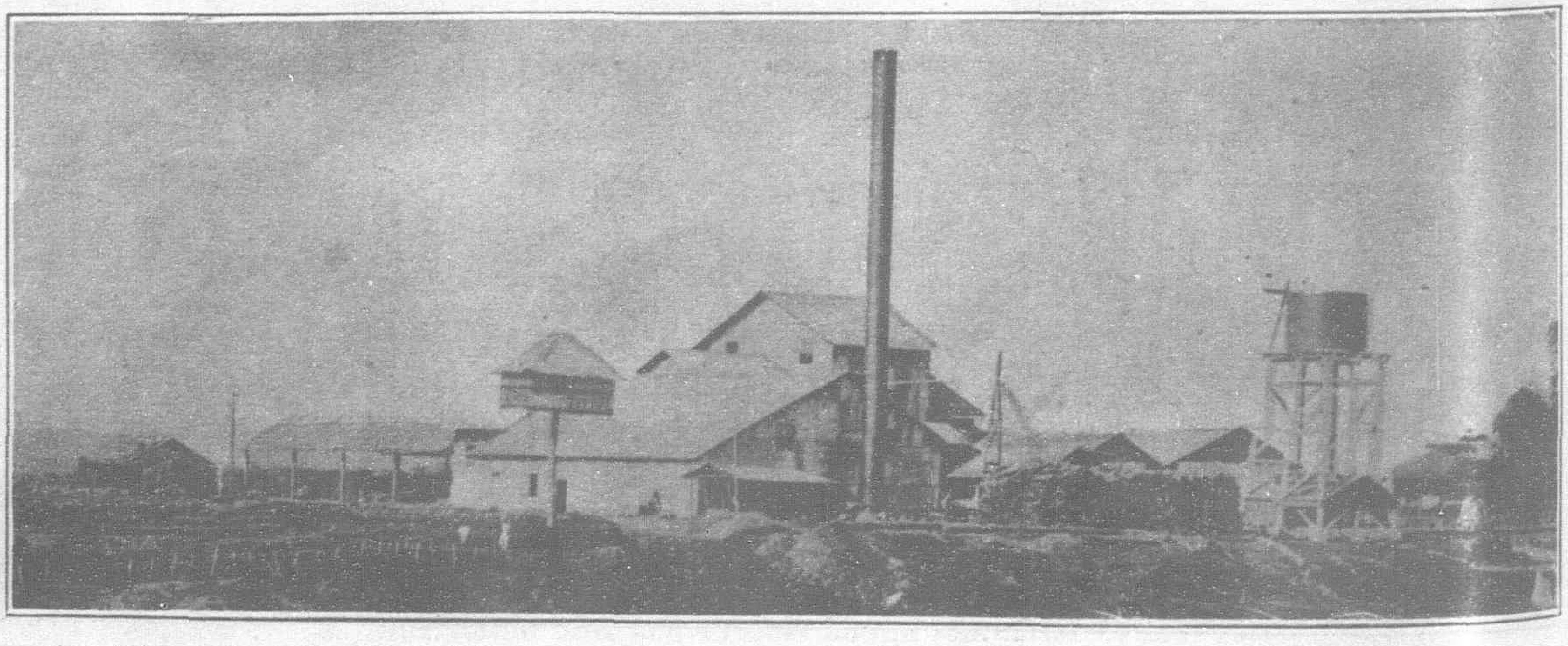
The Philippine government would be doing no more than its duty by rendering to the local sugar industry the same assistance that Japan rendered to the industry in Formosa, for most of the problems that required solving in Formosa exist in the Philippines. The Japanese government sent experts to make a close study of the industry to determine the best means to adopt for the improvement of the methods used both in the cultivation and in the manufacture of the product. The first result of this investigation was the importation of some of the Hawaiian varieties of cane, and it is stated that the prosperity of the Formosan sugar industry dates from this. In 1901 the Japanese government sent Dr. Nitobe, chief of the industries bureau, to Formosa, requesting him to make a thorough investigation of the sugar possibilities of the entire island of Formosa. In his report, Dr. Nitobe outlined a comprehensive plan to be carried out during a ten-year period. The following recommendations made by him are so applicable to the sugar industry in the Philippines that they compel publication :

(1) Improvement of cane by importation of better varieties from other sugar-producing countries ;
(2) Introduction of a more intensive method of cultivation ;
(3) Establishment of a model farm to demonstrate to the farmers the advantages of improved methods ;
(4) Increase the yield by use of artificial irrigation ;
(5) Improvement of manufacturing methods by the introduction of modern sugar machinery;
(6) Make provision to train experts in all branches of the industry.

The Japanese government proceeded to develop the industry along the lines recommended by Dr. Nitobe, and the results exceeded expectations. During the ten-year period prescribed by him, the acreage under cane had increased from 65,000 to 225,000 acres, and the total quantity of sugar produced from 50,000 to over 300,000 tons. The government also granted bounties to planters for the specific purpose of meeting expenses involved in purchasing fertilizers, and modern machinery, and in reclaiming and draining land and making improvements. The adoption of improved methods of cultivation has increased the yield of cane per acre from ten tons to 15 tons and in many instances to 20 tons ; or, in other words, the yield of sugar per acre has increased from 1 ton to 1½ with good prospects that it will soon reach 2 tons according to statistics contained in the government records. It is interesting to note in passing that the bulk of the Formosan cane crops are produced by Chinese. From a table which appears later on showing the yield of sugar per acre in the Philippines, it will be noted that during the past nine years, it has only averaged three-quarters of a ton per acre, less than half the yield obtained in Formosa, and comparing even more unfavorably with the large cane-producing countries of the world.

When we view the tremendous development the co-operation of the Japanese government with private enterprise has made in the Formosan sugar industry during the past twenty years, and reflect that at the end of the same period production in the Philippines is practically the same as it was at the beginning, it would seem that the Philippine government can no longer afford to close its eyes to the necessity of providing the means to stimulate and increase sugar production in the Philippines.

In view of the importance of the sugar industry in the economic welfare of the country, and the excellent prospects in the world's market for sugar, it is to be hoped that the government will take a leaf out of Japan's book and adopt a similar policy of encouragement and assistance to sugar producers. In time the Orient will look to the Philippines to help to meet their increasing requirements of sugar. Japan's need of rice has resulted in the restriction of



San Isidro Central: Original Capacity 150 tons now crushing 250 tons per day with the same crushing plant. An illustration of the smallest type of Honolulu Iron Works Factory

area planted to cane in Formosa, and the Formosan sugar crop is not therefore likely to exceed in future 300,000 tons. The consumption of sugar in Japan has now reached 500,000 tons, and it is evident therefore that Japan will be a large importer of raw sugar in future. It is also possible that the same need of rice will prevent Java from being able to materially increase her sugar production. The Philippines have sufficient land available to produce more rice then they need and to double within a short time their present production of sugar without materially increasing the areas now under cultivation to cane.

It is interesting to note that Cuba, which already employs 40,000 Chinese laborers, in order to safeguard its present sugar production and if possible to increase it, is going to increase this number to 100,000 within the next two years. In Hawaii, 50,000 field laborers are required to produce the annual crop of from 500,000 to 600,000 tons of sugar, but soil and climatic conditions in Cuba are such that the same amount of labor in Cuba could possibly produce three times more sugar than it could in Hawaii. 100,000 Chinese in Cuba should therefore be able to produce from 2,000,000 to 3,000,000 tons of sugar annually. The introduction of 50,000 Chinese into the sugar industry in the Philippines would, through the application of more intensive methods of agriculture, which are not possible under existing conditions, double the present sugar production from the area at present under cultivation for cane.

III

The following statistics on Philippine sugars from authoritative sources may prove of interest to those who have been sufficiently interested in the future of Philippine sugar to have read to this point.

Exports of Sugar from the Philippines, 1891-1918

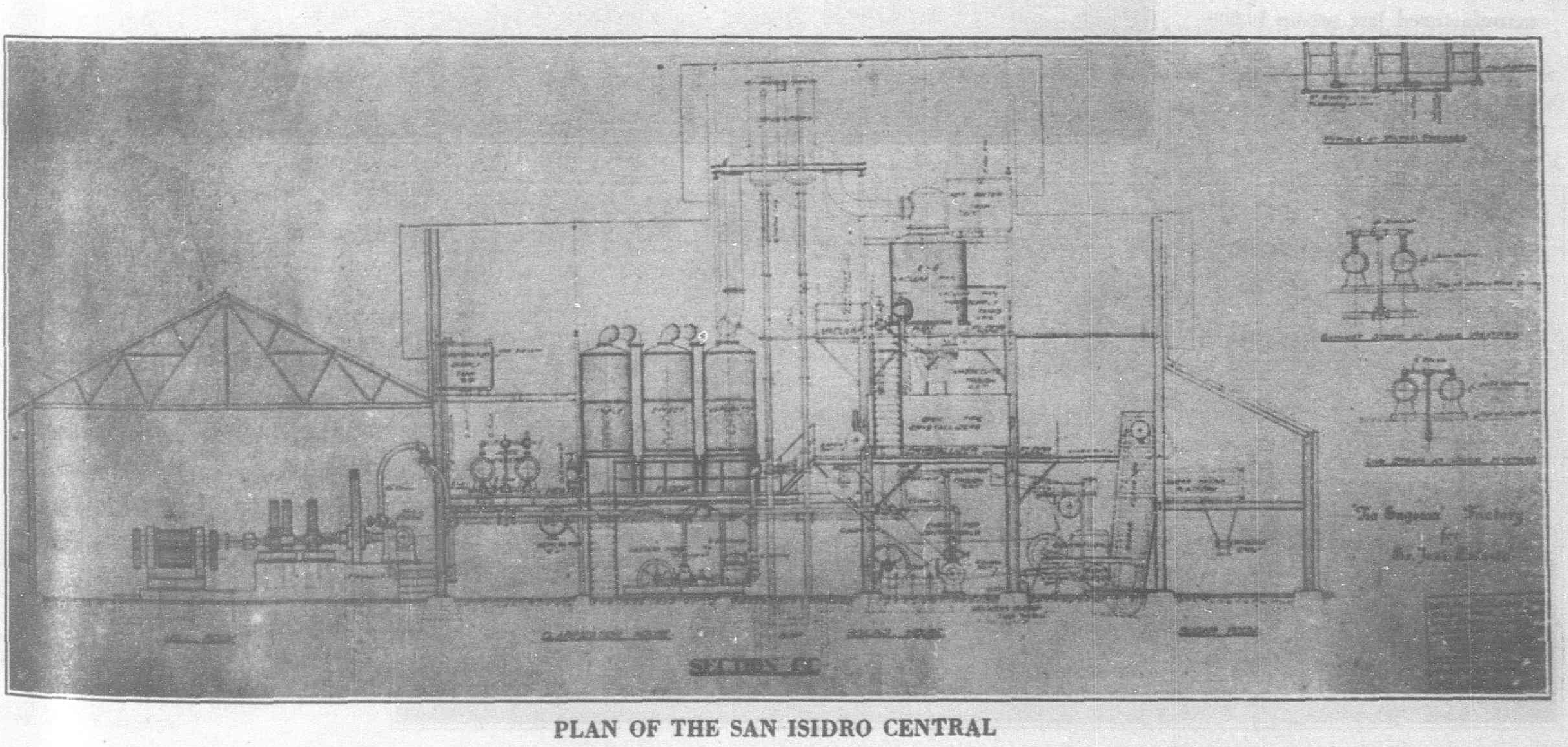
Year	Total Tons of 2,000-lbs.	Exports according to Report of the Insular Collector of Customs for Year 1918 Tons of 2,000-lbs.
Spanish Administration		
1891	187,058,130	
1892	276,868,410	
1893	293,088,740	
1894	217,714,140	
1895	258,813,240	
1896	256,971,680	
1897	226,240,700	
American Occupation		
1898	200,176,270	
1899	104,219,780	94,986,990
1900	69,777,890	72,148,090
1901	62,047,160	62,941,970
1902	103,121,200	109,118,660
1903	100,306,710	94,411,940
1904	91,455,420	96,343,310
1905	117,592,440	120,077,650
1906	139,309,800	143,268,930
1907	136,661,210	141,568,420
1908	153,235,250	160,181,000
1909	138,024,250	143,129,700
1910	130,762,800	134,434,930
1911	232,085,770	231,350,700
1912	215,681,550	218,107,820
1913	171,534,650	174,124,230
1914	260,503,110	261,736,930
1915	232,644,440	233,531,970
1916	374,141,810	373,506,700
1917	229,313,980	227,882,900
1918	285,506,060	302,420,370

The exports during the last seven years of the Spanish administration as shown in the foregoing statement averaged 245,000 tons yearly, and during the past seven years 250,000 tons, showing that in so far as exports are concerned, the local sugar industry occupies to-day practically the same position as it did twenty years ago.

Sugar Production in the Philippine Islands

(Bureau of Agriculture Statistics)

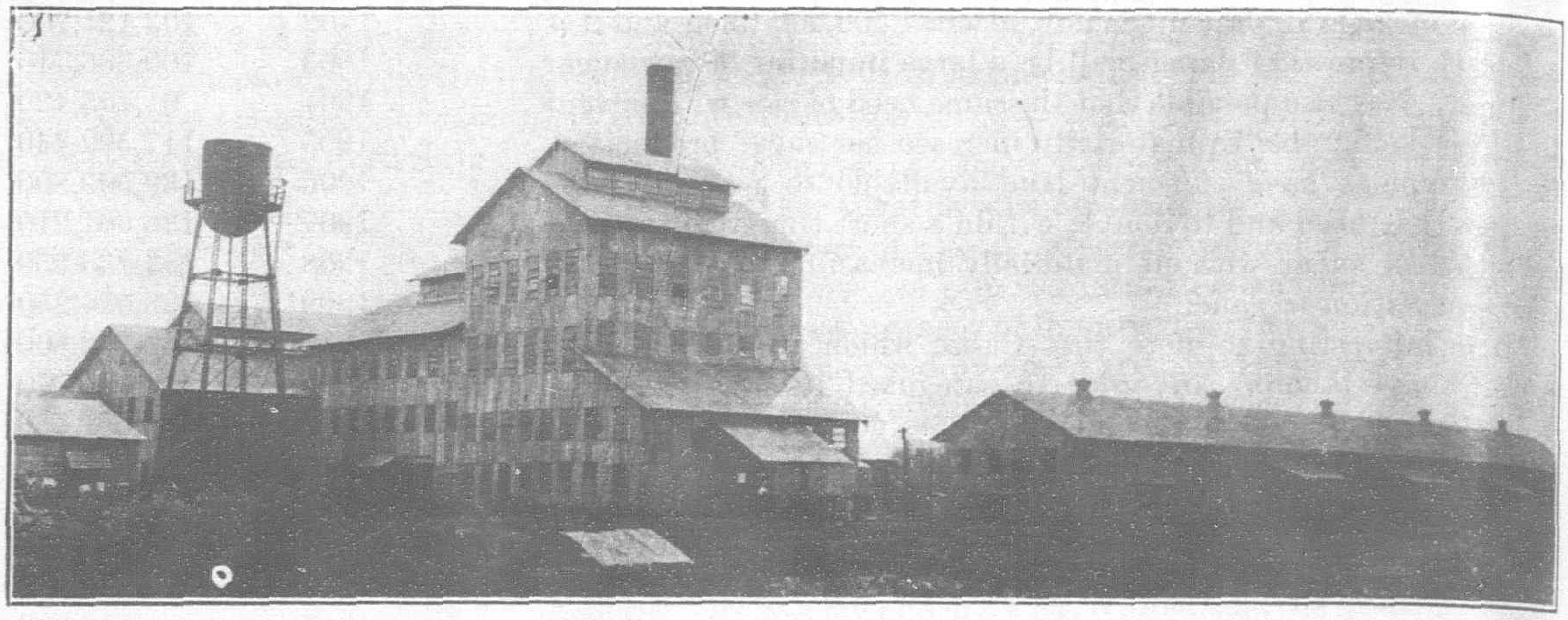
Year	Production Tons of 2,240-lbs.	Area Acres	Tons of sugar per acre
1910	149,913	207,920	0.72
1911	239,568	300,783	0.796
1912	250,685	410,652	0.61
1913	307,461	440,295	0.698
1914	363,494	423,590	0.858
1915	375,280	432,730	0.867
1916	367,334	449,402	0.819
1917	378,910	464,827	0.815
1918	422,995	513,777	0.82
Total	2,855,640	3,643,976	
Average	317,293	404,886	0.78

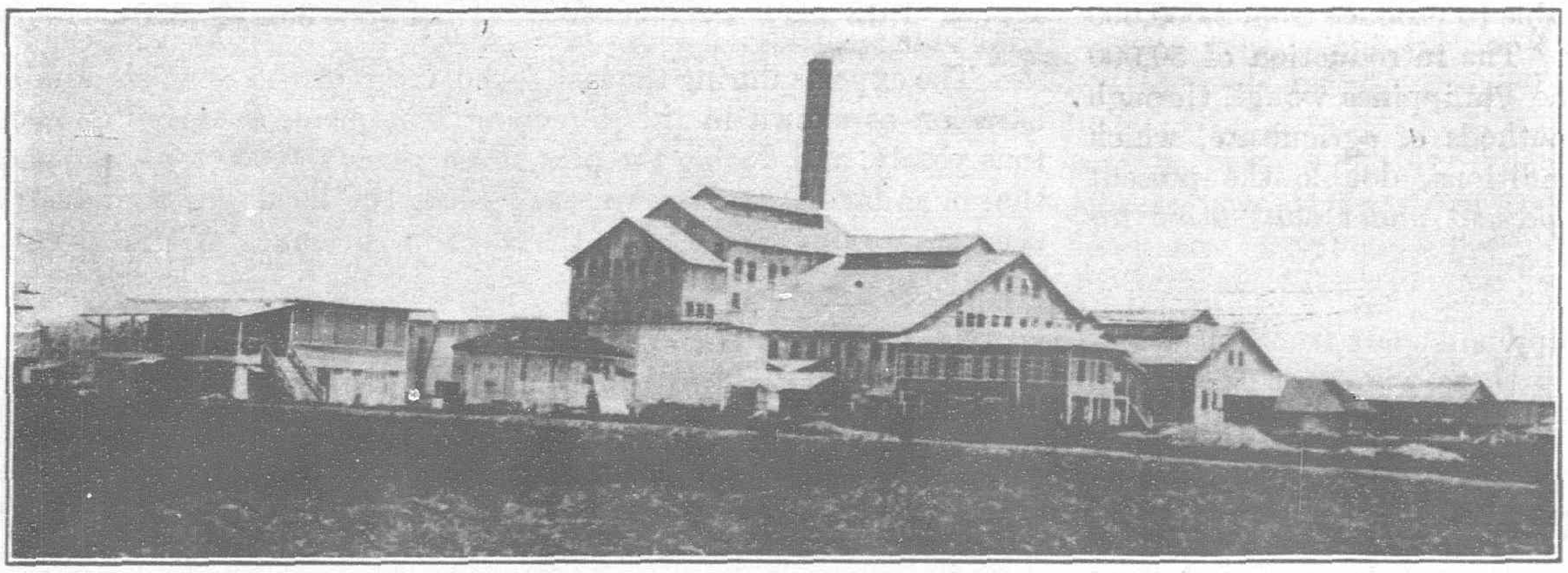


PLAN OF THE SAN ISIDRO CENTRAL

TYPICAL HONOLULU IRON WORKS CENTRALS IN THE P.I.

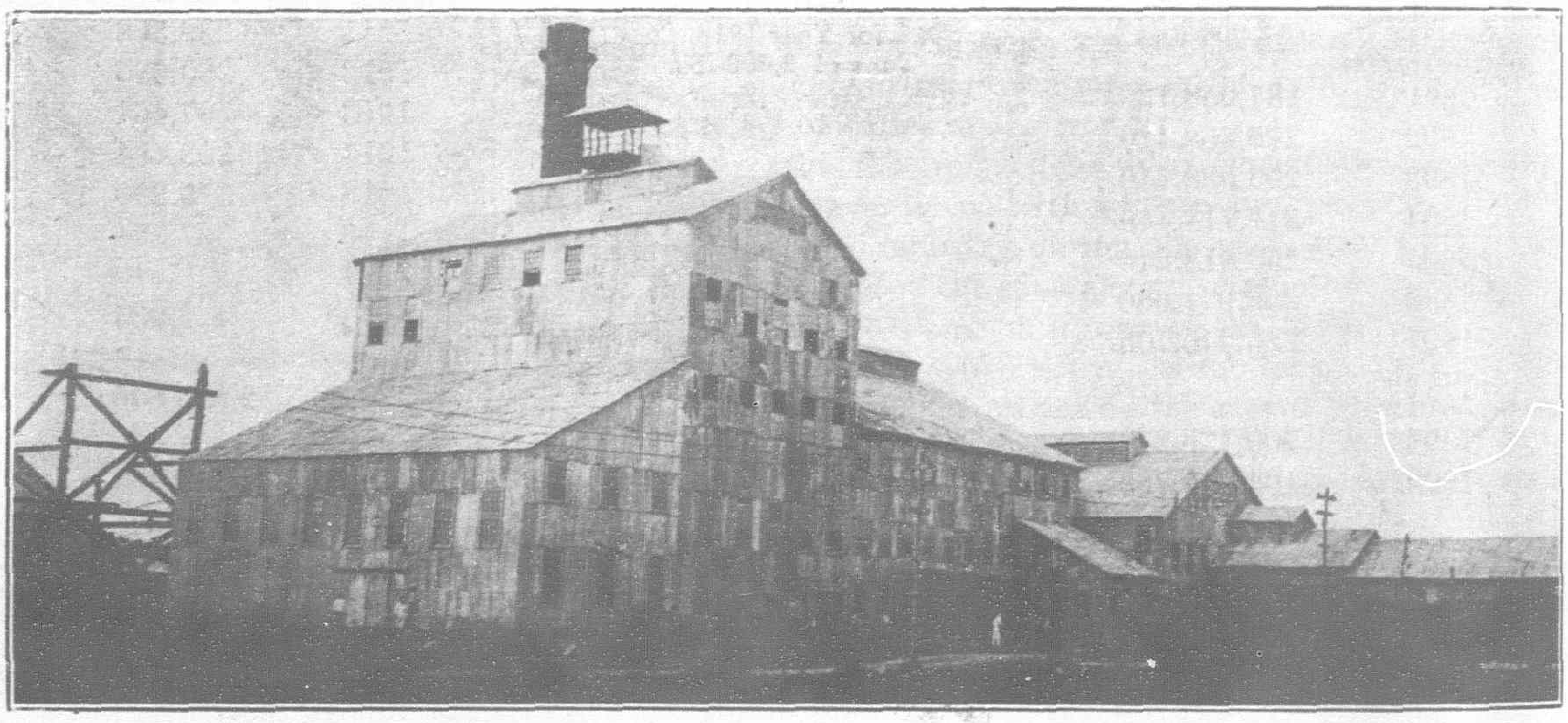
Mill of the Bacolod Murcia Milling Company at Bacolod, Negros Occidental. Capacity, 600-800 tons; Crushing Plant, Nine Roller Mill 30″ by 60″ with two Roll Crusher 30″ by 60″, manufactured 6,000 tons of Sugar the first Season

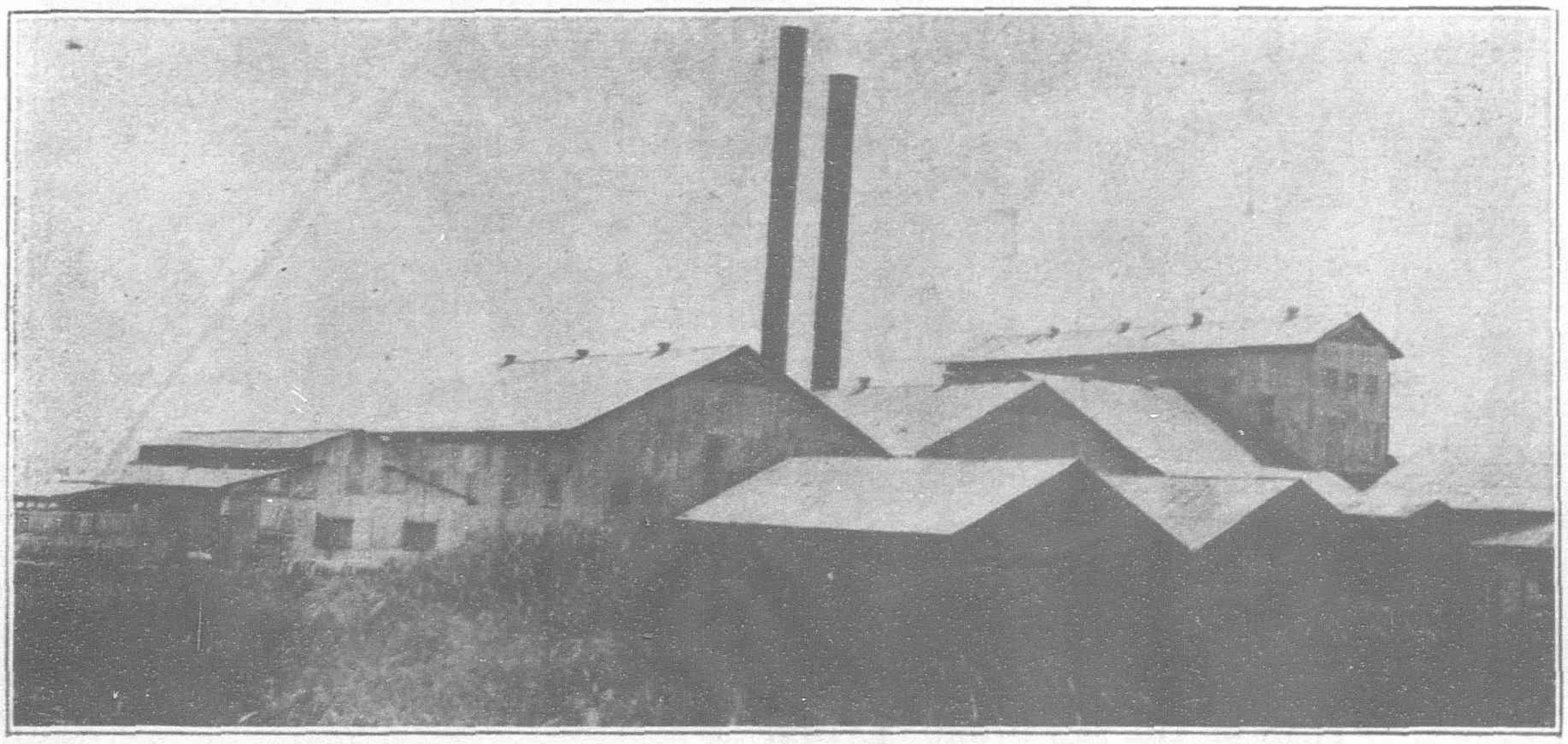




Mill of the Hawaiian Philippine Company located at Silay Negros Occidental. Capacity, 1,500 tons; Crushing Plant, H. I. W. 12 roller mill 34″ by 78″ with 3 Roller Crusher 34″ by 74″ Built and operated for the first season by the Honolulu Iron Works

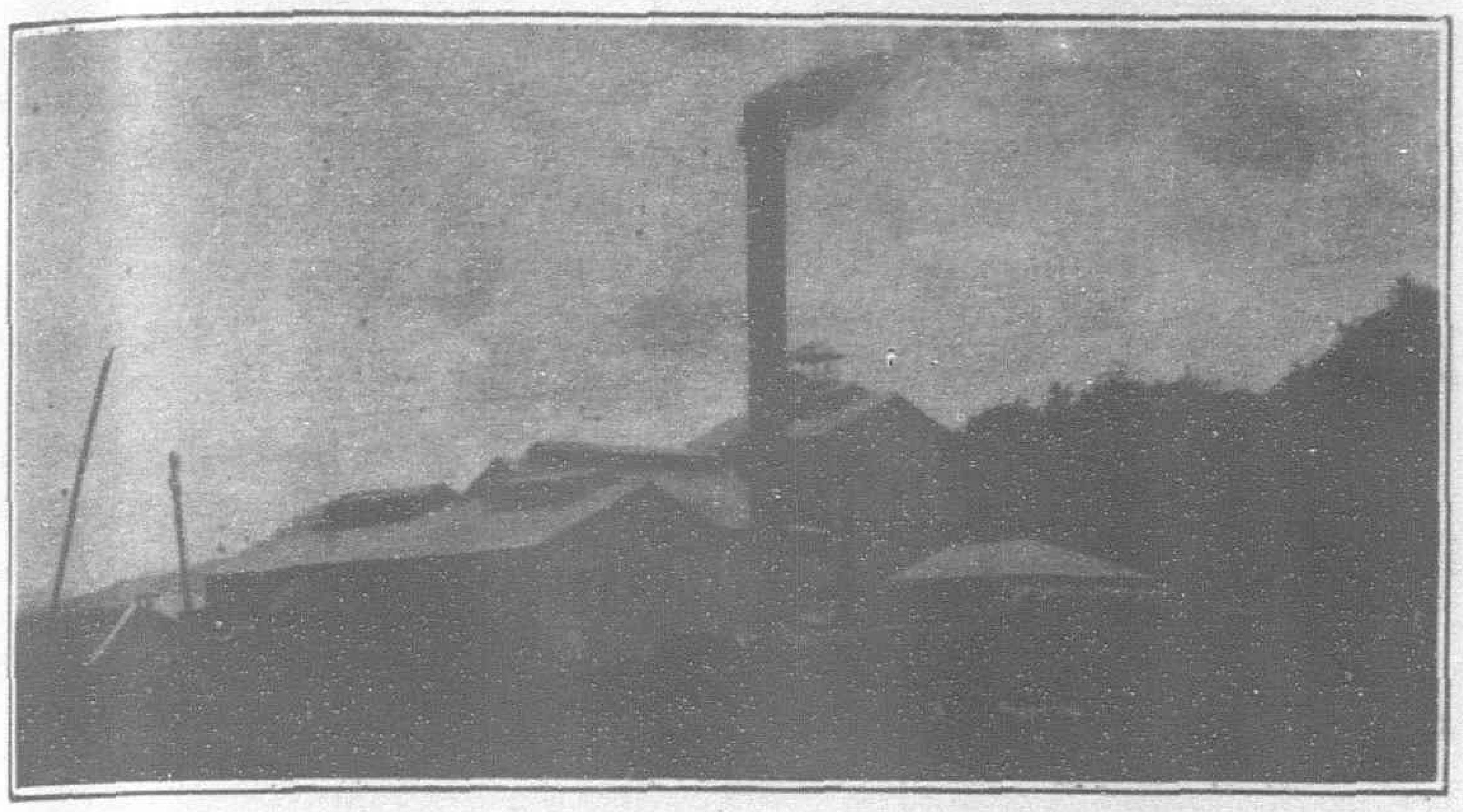
Mill of the Talisay Silay Milling Company located at Talisay, Negros Occidental. Capacity, 1,000 tons; Crushing Plant, 9 roller H. I. W. mill 34″ by 78″ and two Roll Crusher 34″ by 78″. Three exact duplicates of this factory have been built in the Philippines at La Carlota, Bais and Talisay. La Carlota Central manufactured last season 19,000 tons of sugar





Mill of the North Negros Sugar Company, located at Manapla, Occidental Negros. Original capacity, 300 tons, extended to 800 tons in 1919 and to 1,000 tons in 1921. Equipped with 2 sets of H. I. W. nine Roller Mills and two Roller Crushers, 26″ by 54″.

The difference between the quantity of sugar produced and the quantity exported should give some idea of the quantity of sugar consumed in the Philippines, but a comparison between these figures does not provide any satisfactory conclusion. In some years the figures for production practically agree with those for exports, which would mean a ridiculously low figure for the local consumption of sugar; in other years, there is such a disparity between the figures as to make the consumption appear excessive. The quantity of sugar consumed locally has been generally estimated at from 50,000 to 100,000 tons per annum, but I am of the opinion that the latter figure is too high. The per capita consumption of sugar in Japan is 16½-lbs. per annum, and I believe that the per capita consumption in Japan is greater than in the Philippines. Possibly not more than 75,000 tons of sugar are consumed annually in the Philippines. With a population of 10,000,000 people, a consumption of 1,500,000-lbs. allows a per capita consumption of 15-lbs. per annum


Central de Bais, Capacity 1,000 tons

I have referred to the extremely low yield of sugar per acre, which is shown in the above table as being only slightly over three-quarters of a ton. The following statistics from authoritative sources, showing the yields obtained in most of the cane-producing countries, will prove interesting and show the need of the government providing a dependable supply of labor from external or internal sources to permit of intensive methods of cultivation in the Philippines similar to those employed in Formosa and in Java and thereby make it possible for the Filipino cane planter to approximate the yields now being obtained in Formosa where the soil and climatic conditions are inferior to those which are found in the Philippines :

Hawaii	... 5 tons of sugar per acre
Java ...	... 5 tons of sugar per acre
Cuba ...	... 2 tons of sugar per acre
Porto Rico	... 2 tons of sugar per acre
Formosa	... 1½ tons of sugar per acre
Trinidad	... 1 to 1¾ tons of sugar per acre
Jamaica...	... 1½ tons of sugar per acre
Antigua	... 2¼ tons of sugar per acre
Queensland	... 1⅓ to 1¾ tons of sugar per acre
Fiji ...	... 2½ tons of sugar per acre
Mauritius	... 2 tons of sugar per acre
Natal ...	... 2⅓ to 3 tons of sugar per acre
Egypt ...	... 1¾ tons of sugar per acre
*Philippines	... ¾ tons of sugar per acre

Table No. 4

List of Sugar Centrals in the Philippine Islands

SHOWING NAME, LOCATION, YEAR WHEN BUILT, AND CAPACITY IN TONS OF CANE PER DAY.

Calamba Sugar Estate, Canlubang, Laguna (1913), 1,800 tons.
Pampanga Sugar Central, Floridablanca, Pampanga (1919), 1,500 tons.
San Carlos Milling Company, San Carlos, Negros Occidental (1914), 1,200 tons.
Mindore Sugar Company, San Jose, Mindoro (1910), 1,000 tons.
Isabela Sugar Central, Isabela, Negros Occidental (1919), 600 tons.
North Negros Sugar Company, Manapla, Negros Occidental (1918), 600 tons.
Bearing Central, Cabancalan, Negros Occidental (1914), 500 tons.
Philippine Sugar Development Co., Calamba, Laguna (1914), 300 tons.
De La Rama Sugar Central, Bago, Negros Occidental (1913), 300 tons.
Guance Central, Hinigaran, Negros Occidental (1913), 300 tons.
San Isidro Central, Cabancalan, Negros Occidental (1917), 250 tons.
Carmen Central, Calatagan, Batangas (1914), 200 tons.
Palma Central, Ilog, Negros Occidental (1916), 200 tons.
San Antonio Central, La Carlota, Negros Occidental (1913), 150 tons.
Dinalupihan Factory, Dinalupihan, Bataan (1913), 125 tons.
Talisay Central, Talisay, Negros Occidental (1913), 125 tons.
Canlaon Factory, Canlaon, Negros Occidental (1913), 125 tons.
Muntinlupa Factory, Muntinlupa, Rizal (1912), 100 tons.
Saint Louis Oriental Factory, Manaog, Pangasinan (1912), 90 tons.
Lock Factory, Masugbu, Batangas.

Centrals Under Construction

SHOWING NAME, LOCATION, YEAR OF MILLING CROP, AND ARRANGEMENTS MADE FOR INCREASING THE CAPACITY TO 2,000 TONS.

Hawaiian-Philippine Co., Silay, Negros Occidental (1920/21), 1,500 tons.
Ma-ao Sugar Central, Ma-ao, Negros Occidental (1919/20), 1,500 tons.
La Carlota Sugar Central, La Carlota, Negros Occidental (1919/20), 1,000 tons.
Bais Sugar Central, Bais, Negros Occidental (1919/20), 1,000 tons.

Projects Definitely Planned for Development

Talisay-Silay Sugar Central, Talisay, Negros Occidental, 1,000 tons.
Bacelod-Murcia Sugar Central, Bacelod, Negros Occidental, 1,000 tons.
Pampanga Development Co., San Fernando, Pampanga, 1,200 tons.

Small Factories Using Open Train Evaporators and Vacuum Pans

SHOWING NAME, LOCATION, YEAR WHEN BUILT, AND CAPACITY IN TONS OF CANE PER DAY.

Pampanga Sugar Factory, Floridablanca, Pampanga (1619,) 100 tons.
Bernia Factory, Dinalupihan, Bataan (1918), 90 tons.
Kennedy Factory, Isabela, Negros Occidental (1918), 90 tons.
De la Vina Factory, Vallchermosa, Negros Occidental (1918), 90 tons.
Tubigan Sugar Factory, Tubigan, Bohol (1917), 90 tons.

These centrals could easily take off 250,000 tons of 96° sugar during a season, and most of them are so built that their capacity can be increased at small cost to take care of at least another 100,000 tons.

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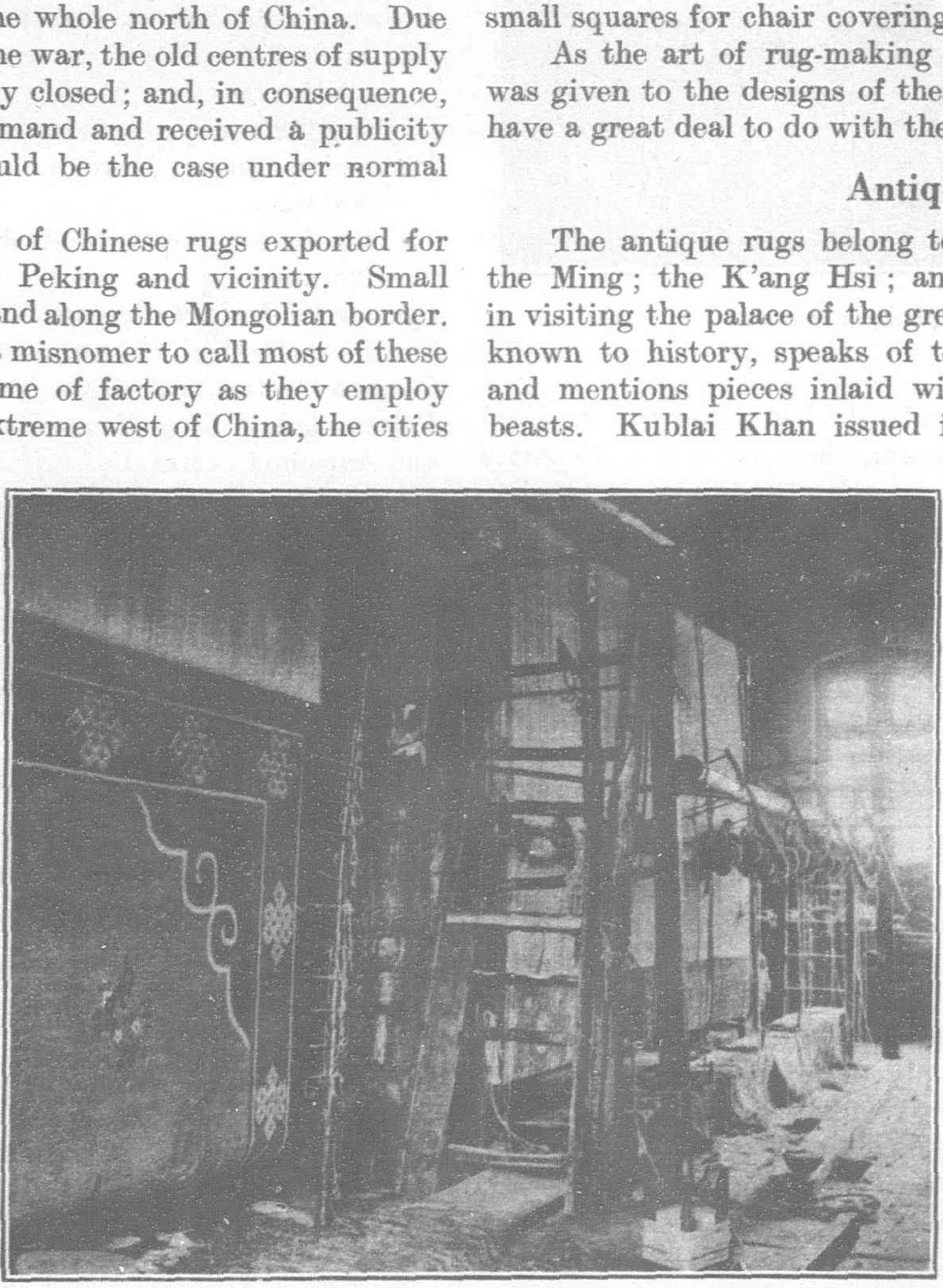
*In places where modern methods are in use the yields equal those obtained in Formosa.

The Rug Industry of North China

By *JAY C. HUSTON*

In describing Chinese rugs, the term "Tientsin Rug" is sometimes used; but this is simply because the first products of this kind to be shipped to America and Europe were shipped from the port of Tientsin. The place of origin of these same "Tientsin Rugs" might well be in Peking or somewhere in Mongolia, as the methods of manufacture are the same for the whole north of China. Due to abnormal conditions created by the war, the old centres of supply in Turkey and Persia were practically closed; and, in consequence, the Chinese rug came to have a demand and received a publicity all out of proportion to what would be the case under normal conditions.

Probably the greatest number of Chinese rugs exported for foreign use are made in Tientsin, Peking and vicinity. Small rug factories are located in Kalgan and along the Mongolian border. In the strict sense of the term it is a misnomer to call most of these weaving establishments by the name of factory as they employ but five or six workmen. In the extreme west of China, the cities of Hami, Kotan and Kashgar produce a very fine grade of rug but very few of these find their way to the foreign market. There are also carpet factories at Kweihwating, Saratsi and Paotowchen in Shensi province. Smaller centres of rug-making are located at Paotingfu, Mukden and Shanghai; but the bulk of the commercial product is made at the two large population centres of the north under the direct supervision of the foreign buyer or expert.



The Interior of a Rug Factory

History of the Chinese Rug

Experts differ as to how long ago the Chinese began to make rugs. There are some who think it is indigenous to China and others who maintain that it is an acquired art. Nevertheless, it is safe to say that like the other arts of the flowery republic, Chinese rug-making is of very great antiquity.

The Chinese rug was not originally designed as a floor covering; but was used upon the *k'ang*, a sort of divan. It is by means of the *k'ang* that the Chinese family in the north of China is able to keep warm during the long winter months. This couch-like arrangement is made of bricks or mud; and is an indispensible part of every Chinese household. It is built across one end of the room. In winter a fire is kept burning underneath; and the members of family spend a great deal of their time upon the *k'ang*. Among the poorer classes the only covering of the *k'ang* is a coarse piece of matting. In the homes of the wealthy classes, rugs generally serve as coverings. Thus the original purpose of the Chinese rug was utilitarian rather than ornamental. To-day, in Western China, travelers carry their rugs with them to spread upon the *k'angs* of the Chinese inns. These inns furnish no luxuries in the shape of bedding. The guest is supposed to carry it with him. These rugs are known as "Travelers' Rugs": and are of various designs, generally depicting scenes which the Chinese traveler is liable to meet with upon his journey. The boatman on the Yellow River in Kansu carries his rug as a necessary part of his outfit. He squats upon it by day and sleeps upon it by night. These rugs are made from the best wool; and are generally handed down from father to son. Age seems to add rather than detract from their beauty in lustre and tones of color.

A later development was the use of the rug as hanging in temples and palaces. Other uses were made of it in the form of small squares for chair coverings and for saddle cloths.

As the art of rug-making advanced much thought and time was given to the designs of these pieces as they were supposed to have a great deal to do with the future happiness of the recipients.

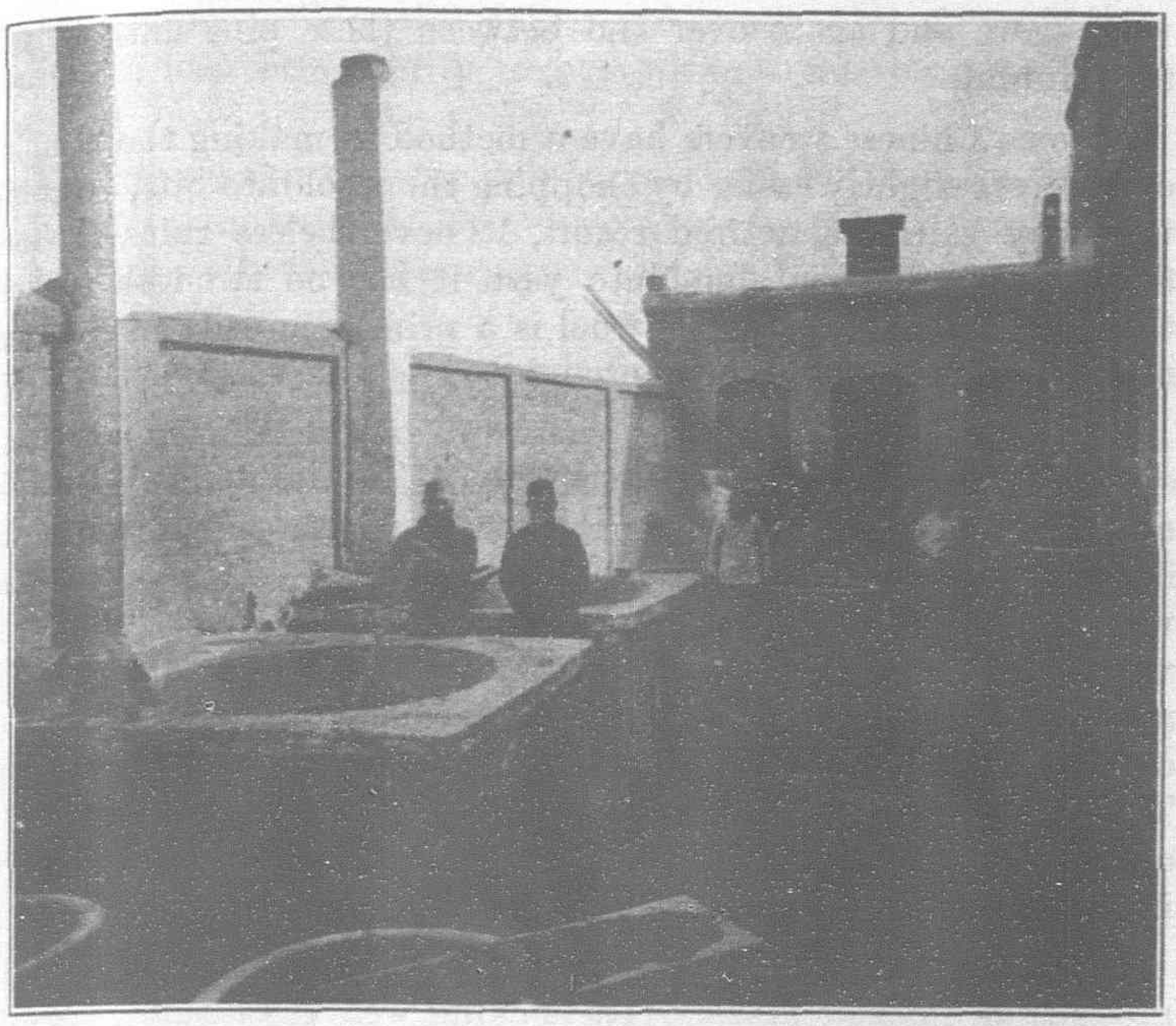
Antique Rugs

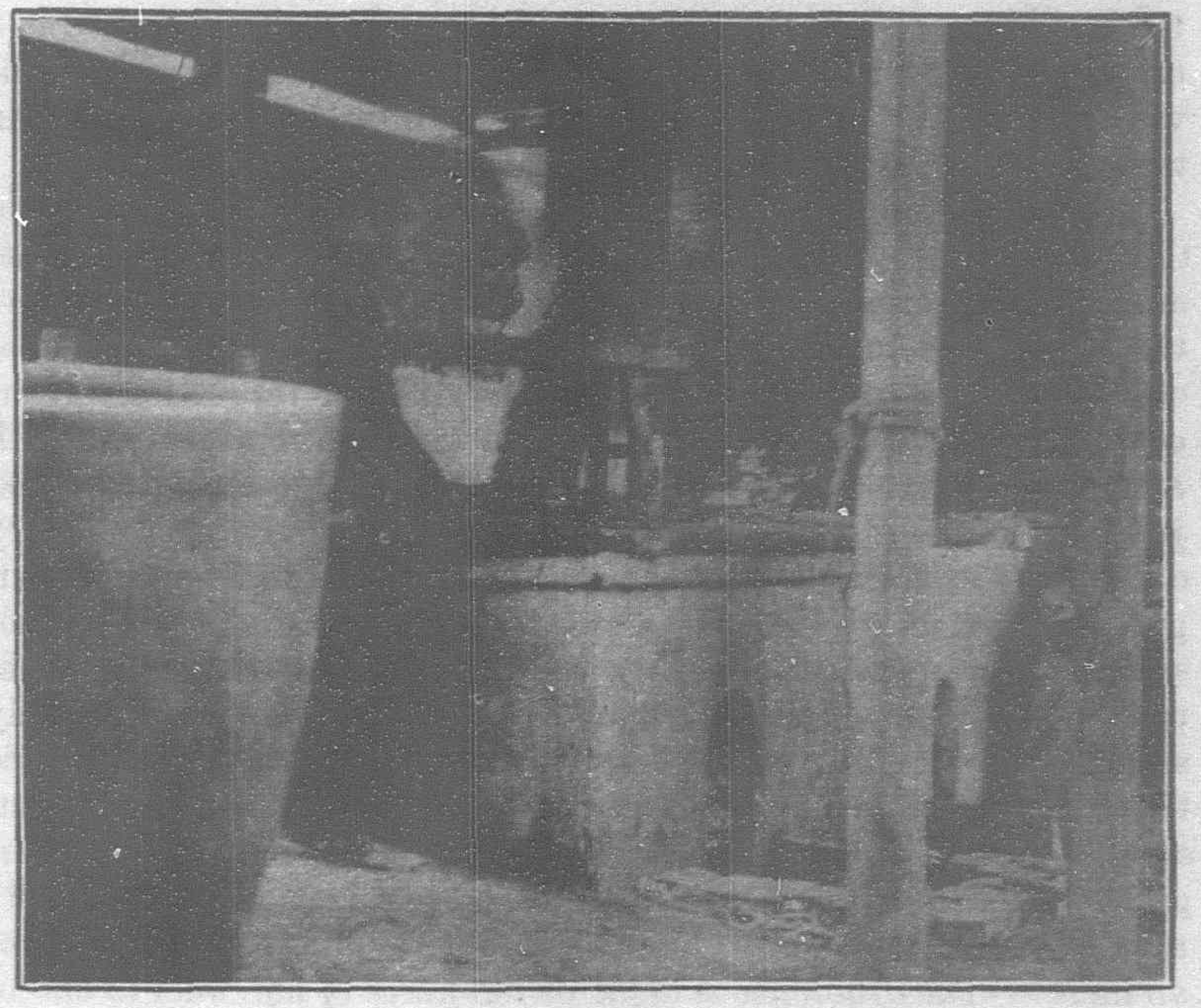
The antique rugs belong to three periods of Chinese history: the Ming; the K'ang Hsi; and the Ch'ien Lung. Marco Polo, in visiting the palace of the great Khan, or Kublai Khan as he is known to history, speaks of the beautiful rugs of the palaces; and mentions pieces inlaid with figures representing birds and beasts. Kublai Khan issued in the Yuan or Mongol dynasty (1260-1368), which preceded the Ming; and by reason of his conquest of western nations; brought into China a reviving influence from the outside. New arts were introduced to the Chinese, and the stagnant pool of Chinese life untouched for centuries from the outside experienced a brief renaissance. Arabian and Persian art had a great influence in the time of the Mongol. This influence was felt in all branches of Chinese art, but unfortunately no example of the rug-maker's skill has survived to the present day. The Ming dynasty was a pure Chinese dynasty, and was founded in 1368 A.D. From the middle of this dynasty art suffered a "reversion to type," which was due to a servile imitation of old master and the blind following of set rules and cañons. There are very few rugs of this period to be found. They are coarse in texture with plain geometrical figures more or less simple in color and regular in design. The Manchus began to rule China in 1644 A. D. K'ang Hsi was one of the strongest and most brilliant of the Manchu rulers. The rugs of this period have elaborate geometrical designs and are very closely woven. The Ch'ien Lung period begins with 1736 A.D. This emperor imported weavers from the west. The rugs of this period are generally floral in design with medallions. The outer borders of the rugs of this period are generally a deep blue. This was China's golden age in the art of rug-making. The designs of the later epochs are difficult to classify.

Connoisseurs and rug collectors have made antique rugs a rare article, and to-day there are doubtless more of these works of art in America and Europe than in China. But in remote places some old Mongolian rugs are still to be found. These were originally made in China and supplied to the Mongols for use by their princes, high lamas and in the temples.

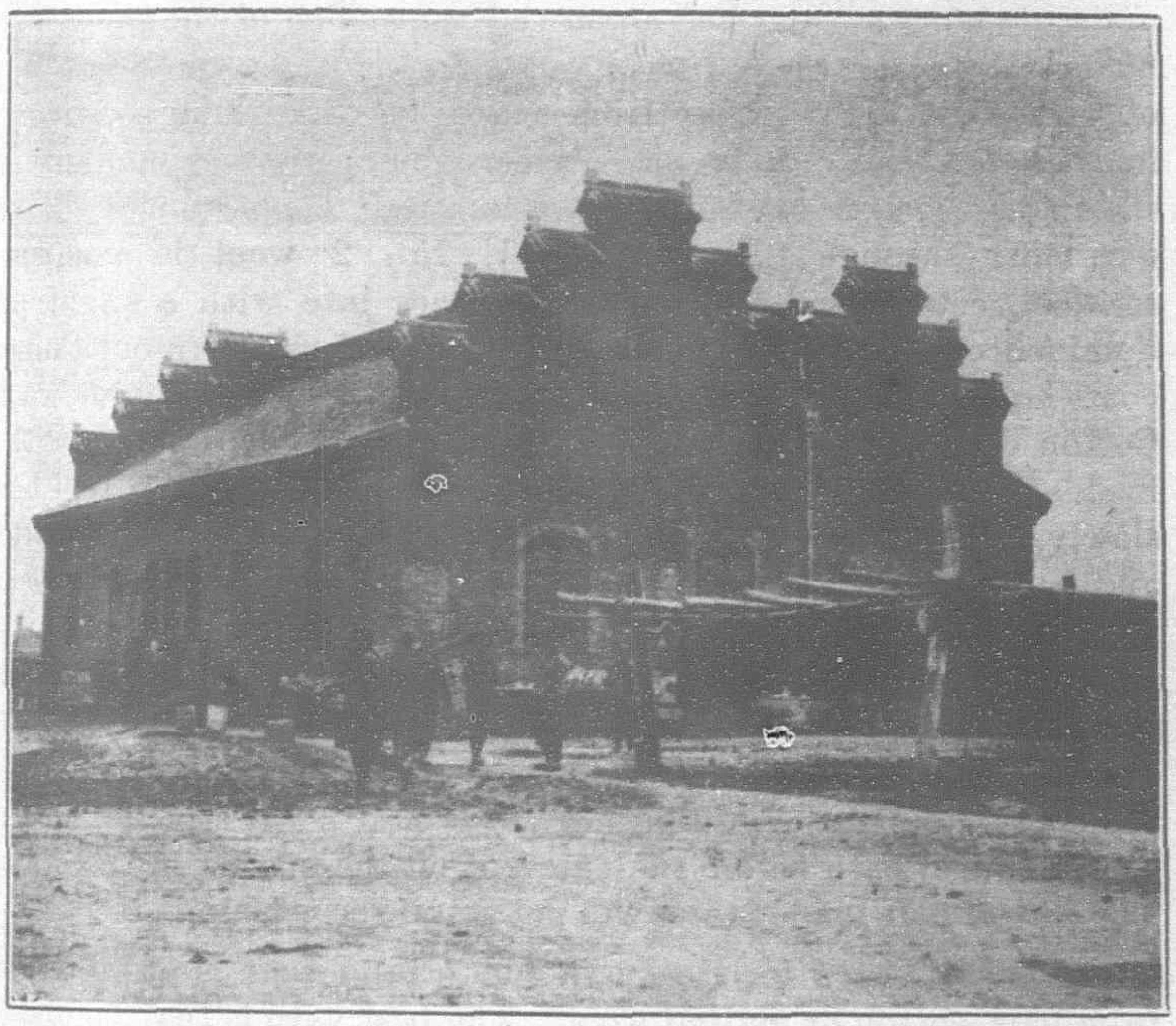
Wool

Mongolia with its bands of nomadic herds and their flock furnish an abundant supply of wool for the demands of the local



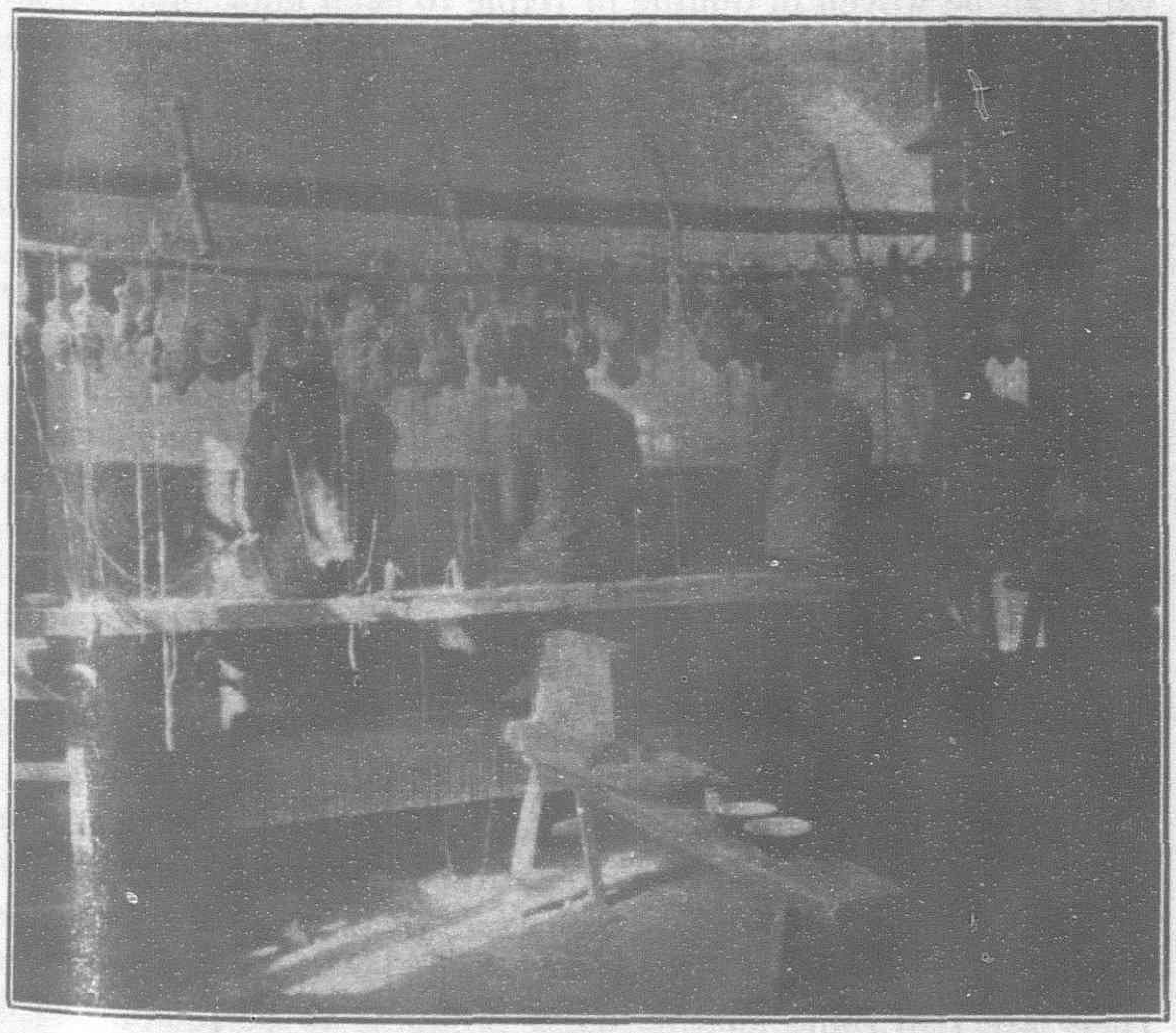


Two Types of Dye Vats in a Rug Factory



A Tientsin Rug Factory

Drying the Dyed Yarn



Weaving the Design

The Design Woven

trade. Caravans of camels, sometimes as many as five hundred in a caravan, arrive at Kalgan with immense cargoes of wool. This wool is picked up at different points in the interior of the Mongolian tableland. It is then shipped by rail to Peking and Tientsin.

Different kinds of materials are used in the manufacture of the Chinese rug, the principal one being sheep's wool with camel and goat's wool ranking next in the order of importance. Sometimes rugs are made from silk; but do not make suitable floor coverings, and are rather used for coverings or tapestries. Hair, cotton, hemp and jute are oftentimes used in combination with a little wool to make a cheap grade of rug. One must be a good judge of wools in order to be a judge of rugs. It is often very difficult to distinguish hair from wool. Wool often can be distinguished from hair by its softness and elasticity. Under the microscope, a fibre of wool remotely resembles in appearance a pine-tree cone with overlapping edges or scales. It shows a "highly serrated surface." "A fine grade wool will have nearly three thousand serrations to the inch and a diameter of one-two-thousandth of an inch to one-three-thousandth of an inch, while a poor grade will only have about a fifth as many serrations to the inch; and a diameter of only one-two-hundred and seventy-fifth of an inch." The difference is eight or ten fibres of fine wool to one of coarse in the final make-up of the rug. In the fine wool rug there is everything to be desired; retention of color, resiliency and lustre which is not the case in a cheap grade rug.

There are the spring and autumn sheep's wool, and sometimes the spring sheep wool combings and lamb's wool. The later is sheared from the young lambs at about age of eight months. The Mongolian shepherds are adept as shearsmen and the fleeces are skilfully sorted. After the shearing process, the wool is sold to merchants, traders or rug-makers. Foreign wool experts say that Chinese wool is not quite as high-grade as that produced in the countries where they specialize in stock breeding.

The craftsmen in Western China are more careful in the preparation of the wool which they put into their rugs. Every craftsmen has a different method of treatment. After the sticks and foreign substances are removed comes the washing and scouring. In this process there also exists a variety of treatment. The general method of procedure is to wash the wool many times without allowing it time to dry. It is then placed in the tubs in which a bean known to Chinese is placed; and the mass is pounded and boiled until the wool has been entirely cleansed. This bean cuts the grease. If any grease is left in the wool, the dye will not take as well as if the wool were all free from oils or fats. A great deal also depends upon the quality of water used in the washing. Soft water is the thing desired as hard water necessitates the use of potash. Potash cuts the wool in such a manner as to decidedly shorten the life of the rug. Some Chinese rug-makers have been known to use lime. This also injures the wool. Soap is sometimes used to clean the wool; but this is more or less expensive.

The washing process finished, the wool is then exposed in the sun to dry. In the eyes of a careful Chinese craftsman this demands an equal amount of attention. After passing through all these processes the wool is then weighed ready to be picked and carded. There is considerable difference between the weight of the fleece when it come from the hands of the shearer and the residue that is left after it has passed through the many washing and drying processes.

The methods used for loosing the wool from the mats in which it is left after drying are two. One which is in general use, is a huge bow made of some strong hard wood which varies in size from six to ten feet in length suspended by its middle from the ceiling so that the card made of gut just touches the heap of wool. The picker who is generally a boy is armed with a wooden mallet which he plies in staccato time upon the bowstring. The vibration of the cord whips the wool loose and flings it aside wisp by wisp. The other method, which is seldom used, consists of a long block of wood or a wooden frame from which protudes long perpendicular pins. The boy apprentice squats on the ground and draws the wool again and again over and between these pins until it is fit for spinning.

Some Chinese weavers have a method of making the combing out process slightly easier by chopping the wool into bits, but while this may gain the desired result, it nevertheless ruins the long fibered wool. When spun into yarn it has no strength to hold together, and a long fibered wool is a prime requisite in good rug-making. This can be prevented by close supervision.

Sometimes the wandering shepherds of Mongolia carry a small spindle and distaff, and twirl the spindle as they tend their flock, especially near the Kansu border, where rug-making is an important industry. Some of the wool, however, is spun by the old men and women in the border villages. Each spinner strolls about the village with a wad of raw wool and a hand spindle, and by the mechanical twirling of the spindle gradually accumulates a ball of yarn, meanwhile entering into a lively exchange of village gossip. Thus the Chinese rug is a hand-made product from beginning to end. This yarn is in great demand but is bound to be limited in amount.

The Chinese weaver in the treaty ports if left to himself will produce an inferior fabric. The Peking weaver classifies his wool into three grades. His No. 1 is the best grade of wool; and may differ greatly from that of another shop depending altogether upon his honesty, and also upon the knowledge of the prospective buyer. In general No. 1 wool yarn is made up of the finest kind of wool; and entirely free from coarse hair-like fibre so common in cheaper yarns. It is also better spun; that is, uniform in size and free from bunches of matted wool which will not dye clear through like the No. 1. No. 2 wool is composed of wool, cotton and hair and sometimes jute with a slight predominence of the first. The cotton linings of old worn-out Chinese coats are commonly pulled out and mixed with second grade wools. Cotton can be detected by applying a match. If it burns with a flash and leaves no remains, it is cotton. If it is wool, it will burn slowly, gives off an odor; and deposit small bits of carbon. Cotton and hair will not absorb the dye as well as pure wool and presents a dull dead appearance after slight use. The pure wool rug as it ages increases in the beauty of its tones and luster; while the hairy textured fabric will dull down and wear off rapidly. No. 3 grade wool is a compound of a very little wool, cotton and a considerable quantity of dog's or cow's hair. All rugs are treated to a chemical bath before they are put on the market in the states. The cotton-hair-made fabric will not stand the washing process.

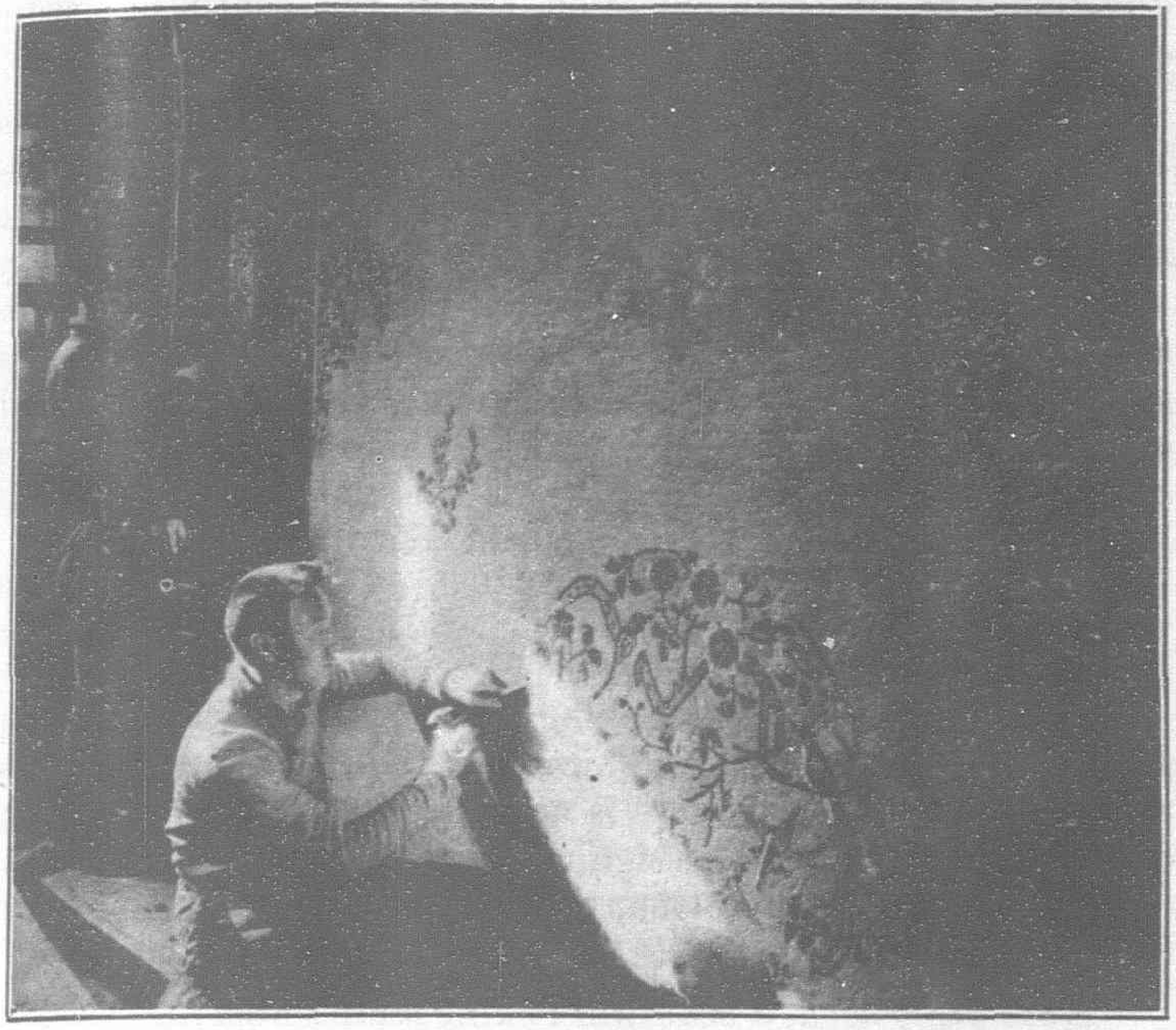
The best wool for rugs is a fine strand that is entirely free from hair, cotton or matted wool. The best yarn is that composed of but few small strands. In making rugs of coarse weave the yarn can be woven in double or triple to each knot; and the effect on the surface of the finished rug is far better than if a coarse strand yarn of the same wool is used.

Dyeing

From the Chinese point of view the dye is one of the most important considerations in the make-up of a rug. In Western China we find that the craftman whose family has doubtless been in the business for generations takes a greater pride in the production of a certain color than do the newly established rugmen in Peking and vicinity. Ningshia dyes never fades, so the saying goes in China. Yet the native dyes used in Peking, if properly set, will outlast the carpet Providing the dyer does his work honestly there is nothing that has yet been discovered that will bleach the rug without ruining the fabric. The rug can be boiled to shreds without effecting the dye in the least.

Before the war when analine dyes were much cheaper, some native rugmen preferred to use analine dyes because it simplified the process and was less expensive. The analine dye product quickly fades and will not stand up under the washing process. There are still some analine dyed products to be found, and the native rugmen occasionally foists one upon the unsuspecting tourist who has the temerity to buy without the intervention of an expert.

Every rug-maker dyes the yarn to match the colors in the designs which are submitted. At one dyeing he must make enough to finish the rug otherwise there is a variation in the color and the rug is streaked. The yarn is dyed in large iron cauldrons in which the dye is first made. How long the yarn must remain in a given dye demands upon the dyer's skill. The skilled dyer times his work just like a photographer times his photographic plate. The dye should never he wrung from the skein as this results in uneven distribution. Sometimes it is rinsed several times in cold water before it is hung up to dry. The master hand knows the exact moment when the yarn has finished hanging in the sun. The dye-maker has no books or recipe. He carries all his formulas in his head. There is generally displayed at some place in the shop a great number of small patterns showing all the different colors and tints of which that particular proprietor is master. When a rug-maker receives an order for a rug the whole supply of yarn to be used is dyed and set. It is then displayed pending the buyer's inspection before the weavers are set to work. If a particular shade is sought the dyer will experiment until the required tint has been found.



Trimming the Rug

Dyes

The old Chinese rug-makers while masters in the art of color-making confined themselves to a very limited schedule of colors. This has been followed to a greater or less degree by the moderns. In the use of blues and yellows the Chinese artisan doubtless stands pre-eminent. Yellow has had greater significances on account of its association with the imperial house. The use of the true imperial yellow is very rare although an endless number of shades in this color are designated imperial. The reds sometimes have a yellowish hue. There are many shades of salmon pink and reds. The salmon pink is produced from species of redwood grown in Western China.

Minerals are scarcely, if ever, used. The dyers of Ningsha in Kansu are famous for their beautiful shades of red. This color is produced from a berry which is grown in the province. Red is also produced from a wood grown in China which the rug-makers call redwood. Madder, rubia cordifolia, is a creeper the stems and roots of which are ground and boiled producing a red that is used as the basis of many shades. It is also said that some of the old craftsmen occasionally use sheep's blood to produce a deep vermillion. Perhaps the best known red dye in China is the safflower. The seed of this flower was said to have originally come from Turkestan.

Brown comes from the dye yam, or *shu-liang*, as the Chinese call it. It produces a dark brown color, and is widely used in China in the dyeing of cloth. If a darker shade is desired gallnuts and alum are used. Acorn husks are sometimes used to produce this color.

Blue comes from the indigo plant. One of the many varieties which grow in China, the polygonum tinototium, is grown in the northern provinces. The use of blue is rather a difficult and tedious process. If the work is carelessly done the blue does not go clear through, and the yarn when woven into the rug and clipped off shows a white spot in the centre of the strand. If a rug is made up of such yarn it produces a very disagreeable effect. Most of the blues used by the Chinese have indigo as their basis; and this in combination with other materials produces all the shades known.

Purple is produced from hollyhocks and from the bark of lithospermum erythrorhison. The coloring matter is brightest if the plant is dug up in early spring.

Yellow is obtained from the buds of a large tree known as sopora japonina widely scattered over China. Lotus seed also produces a yellow as well as an olive green. Some craftsmen first dye the yarn a fast yellow. When it is set, it is dipped in red and exposed to the air for a very long period. As a result the red fades and the yellow comes out. There remains just a blush of red; an effect that is very pleasing to the eye. Green dyes are obtained from rhamus tinctorius and other species of buckthorn. Indigo and yellow produce a green dye, but this color is very seldom used in Chinese rugs.

Black is produced from gallnuts. When mixed with cochineal and other substances the powder from the galls produces grey, brown and fawn tints. Black is also obtained from pomegranates rind and vinegar.

Rugshops

When one sees the dark holes and small places in which most Chinese rugs are produced the wonder grows as to how anything so beautiful could be produced under such an environment. Sometimes the rugshop will be found in the rear of another shop and can only be reached after wandering through courtyards redolent with smells peculiar to Chinese surroundings. In Chinese-owned shops, sometimes three or four looms as the press of work demands are crowded into a small ill-lighted, badly ventilated hovel. These places scarcely ever boast a wooden floor. Sometimes thirty or forty little urchines ranging in ages from ten to eighteen years of age work in one small room in the semi-darkness or by the flicker of a smokey wicklight. In the minds of most native rug dealers a well-lighted shop is something that receives no consideration. These youthful workers sit in a row on a plank fixed like a scaffolding in front of the large wooden loom or frame. They toil from daylight until darkness without so much as whisper: happy to have at place to sleep and enough poor "chow" to eat. Other shops only have five or six apprentices. Again a shop may have as many as a hundred weavers. The proprietor merely supervises the work and deals with the buyer. The employees live and sleep on the premises. A few shops under the influence of the foreigner employ only adults; and have modern up-to-date plants that are well lighted and well ventilated. Occasionally a courtyard may contain the complete plant for preparing and dying the wool as well as weaving the rug but the majority of the shops in Peking and Tientsin are very small and merely weave the rug from the design which is submitted by the weaver.

Weaving

The Chinese rug, like most Oriental products of this kind, is not woven but tied. The principal mechanism is the left fingers of the small apprentices. On a heavy wooden frame reaching from the floor to the ceiling is stratched the cotton threads like the strings of a harp. The small hand painted design is submitted to the rugman who sketches his design on white paper according to the actual scale of the rug. It is very essential that the designer be a skilful one ; if he is a poor one the curves are ungraceful and the details of the various patterns are carelessly drawn all of which shows on the finished rug. This pattern is worked in and out of the strings of the warp. When it is in position it is painted onto the warp with black ink. The design is then removed and the workers set to work tying the knots and cutting the string.

Strickly speaking there is no woof ; but the cotton filler is run in after each row of knots has been tied and pounded down. Each boy or workman sits in front of the warp. At his side are a few simple tools. Behind him on a level with the height of his hand is suspended the various balls of yarn which he is to use. He catches the loose end of the color desired and ties two strands of the warp together and cuts the ends of his knots with a small cleaver-like knife. When a row of knots has been finished a length of cotton filler is run through and pounded down with a heavy iron fork which is thrust into the warp. This completed, the row of tufts is then trimmed to even lengths which is one of the most difficult parts of the weaver's work. The object is to cut as nearly as possible the intended length of the pile thus obviating any unnecessary loss. After the rug is finished some proprietors clip the designs along the lines of the pattern, for example, outlining a flower or bird. As a result the pattern is brought into bold relief without the interjection of any other color. This is a Chinese invention which takes the place of the color outline. Each boy or workman takes two feet of rug and side by side they toil with no variety or change of position.

Dyeing of the wool, determination of prices per foot, and selection and completion of design are merely preliminary arrangements in the construction of the rug. In the case of the Chinese shops it is necessary to inspect the fabric at least once a day. If the work is not closely watched a few balls of inferior yarn will be worked in with the good wool in order that the weaver may make a little profit. It may amount to only a few cents or a dollar on the entire piece, but in the mind of this ignorant rug-maker he has beaten you at the game. This cannot be said of every Chinese shop, but it is so general that the foreign expert does not take any chances, and watches the weaving day by day. The poor wool can be worked in so cleverly in small flowers or other designs that the deception cannot be detected.

If the buyer is very particular about having the same design that he has ordered it is necessary for him to closely scrutinize the execution of his pattern. The Chinese are often obsessed with the idea that their way of doing things is better than the buyers, and will attempt additions and corrections both in designs and colors. If detected in time the error can be corrected, but the ripping out of work already done only serves to weaken the fabric.

The Chinese workman also has a habit of lapping the weft threads in the same spot each time in order to save himself the trouble of reaching too far one way or the other. This can be easily detected by looking at the back of the rug which shows a seam. This practice weakens the rug, as a whole.

Designs

The Chinese designer if left to himself adheres strictly to the conventional and symbolic figures which play such an important part in the history of Chinese art. If he is to make a bird rug it is sure to be a collection of every known species. If it is to be a flower rug it is sure to contain the flora of the entire country. If he is allowed to experiment with what he conceives to be foreign design, the result is apt to be hideous.

It is very hard to say just what effect continguous peoples have had on the designs of the Chinese rug. The old rugs from which many of the more modern products are but copies, scarcely ever show a composite design. This is due to the ability of the Chinese to take what they have found in the art of their neighbors, strip it of its elements and embody it in their own designs with touch that is distinctly Chinese.

There is no doubt that Chinese patterns have been greatl influenced by Mohammedan designs. In northwestern Chin before the Mohammedan rebellion of 1871, a large proportion of th population were followers of the prophet. And it is here tha some of the best Chinese rugs are woven. This region is in th direction line of communication across the continent ; and i earlier times the old trade routes passed through these regions.

Buddhism was introduced into China 61 A.D.; and in three hundred years it had become firmly established. Its advent opened new vistas and developed greater possibilities in the artistic genius of the Chinese race. This influence of Buddhistic art is everywhere apparent. This in turn was influenced by Hindu art which also borrowed from the Greek. The Swastika, for instance, is of great antiquity and wide defusion among the different races. It is mentioned in the Ramayana and as an emblem of Thor even among the Teutonic races. In China it is the symbol of Buddha's heart. It is also used as a symbol for ten thousand years.

Values

What is the value of a Peking rug ? Only the expert who has studied the rug market in China can tell. The mere fact that a rug has 100,90 or 80 strings is not as important as workmanship, color combination, dyes, design and quality of wool. A rug may have an admixture of cotton, cowhair and jute, but the foreign merchant who deals with the Chinese can detect the counterfeit.

Some years back, a beautiful Peking lamb's wool rug made from the finest wool, best dyes and finest workmanship could be bought for fifty to fifty-five cents per foot. In 1915, when the market reached its highest point, the same quality rug could not be bought for less than $3.50 to 4.00 per foot. As with all things the market price is regulated by supply and demand. The arrival of four or five foreign buyers with orders for a few thousand square feet will send the dealers demands up 15 to 20 per cent. The Chinese dealer drives a hard bargain, and the foreign buyer will find it to his advantage to deal with some of the foreign firms on the spot ; and who understand local customs and have had experience in the rug business. Otherwise they are bound to have unpleasant experiences.

The Completed Rug

Many foreign firms in China have factories or control the product of Chinese factories, and by reason of their wide experience are in a position to guarantee their products.

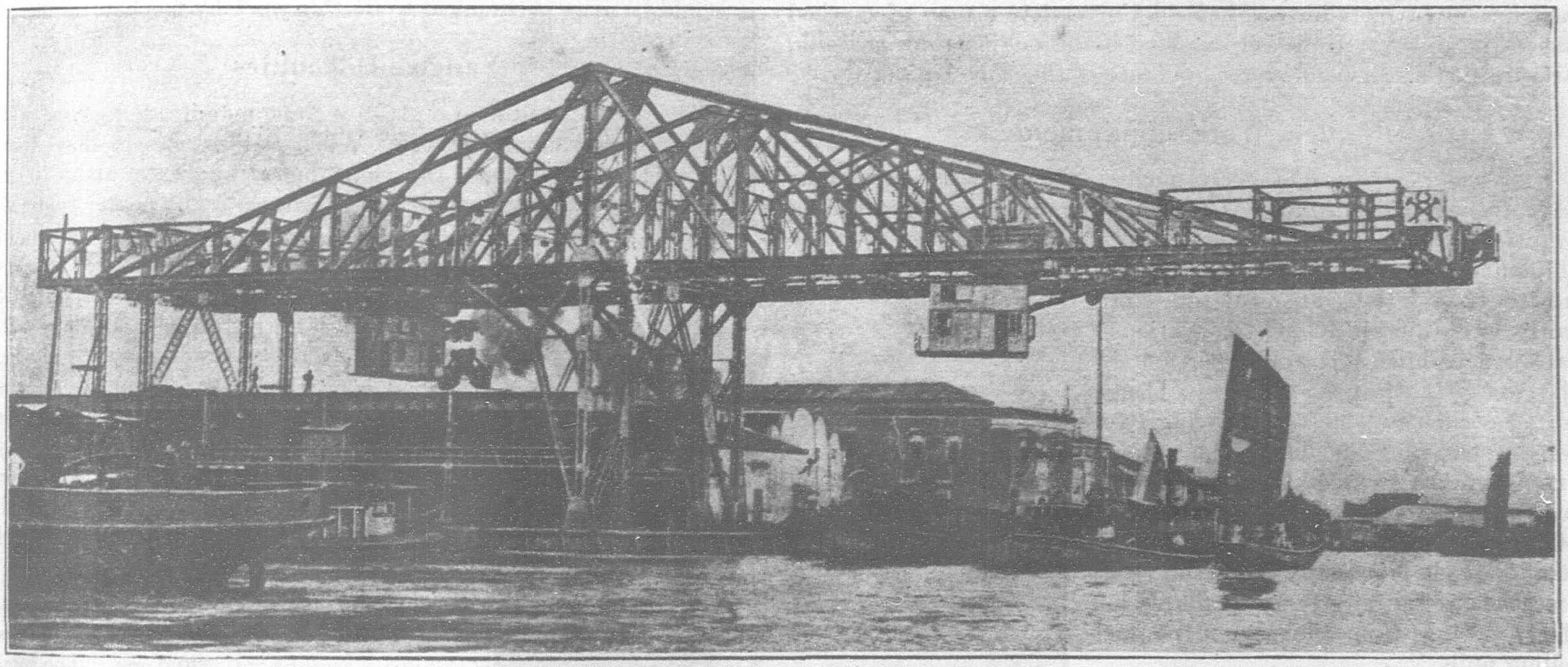
Electric Grab Transporters for Han-Yeh-Ping

Grabbing Ore from Steamers Cheaper then Chinese Coolie Labor

By H. J. Smith, M.I. Mech. E.

(Member of the Engineering Society of China)

FOR many years it has been an accepted fact that coolie labor in the East is far more economical for handling bulk commodities than modern mechanical devices, and as a result, the market for transporters, conveyors, ditchers, hoists and similar labor-saving machinery has not developed in keeping with the expanding demand for other engineering plants. It is a matter for congratulation to see this phase of engineering tackled in a forceful manner by experts with results which not only proves the old idea a fallacy, but that a real and profitable market exists in the Far East for such labor-saving machinery, if special attention and study is given to the subject. It is another testimonial to British enterprise that a British engineer has been the first in opening up the possibilities in this line in China. Mr. H. J. Smith, the head of the mining department of the General Electric Company of China, Ltd., and special representative of the Fraser & Chalmers Engineering Works, Ltd., recently contributed a paper to the Institution of Mechanical Engineers on "The Mechanical Loading of Ships," in which he dealt with four plants erected in cheap labor countries whose operation proved that bulk commodities such as coal and ore can be transported, loaded into steamers and unloaded at less cost than was possible previously by using native manual labor. One of the plants described in the above paper was the electric grab transporters installed at the Han Yeh Ping Steal Works by the Frazer & Chalmers Engineering Works under the direction of Mr. Smith. (*Editor, F.E.R.*)



THE HAN-YEH-PING TRANSPORTER AT WORK

This plant was erected by Chinese labor, under the Sole Control of the Fraser and Chalmers Engineer, Mr. H. J. Smith, the only white man on the job.

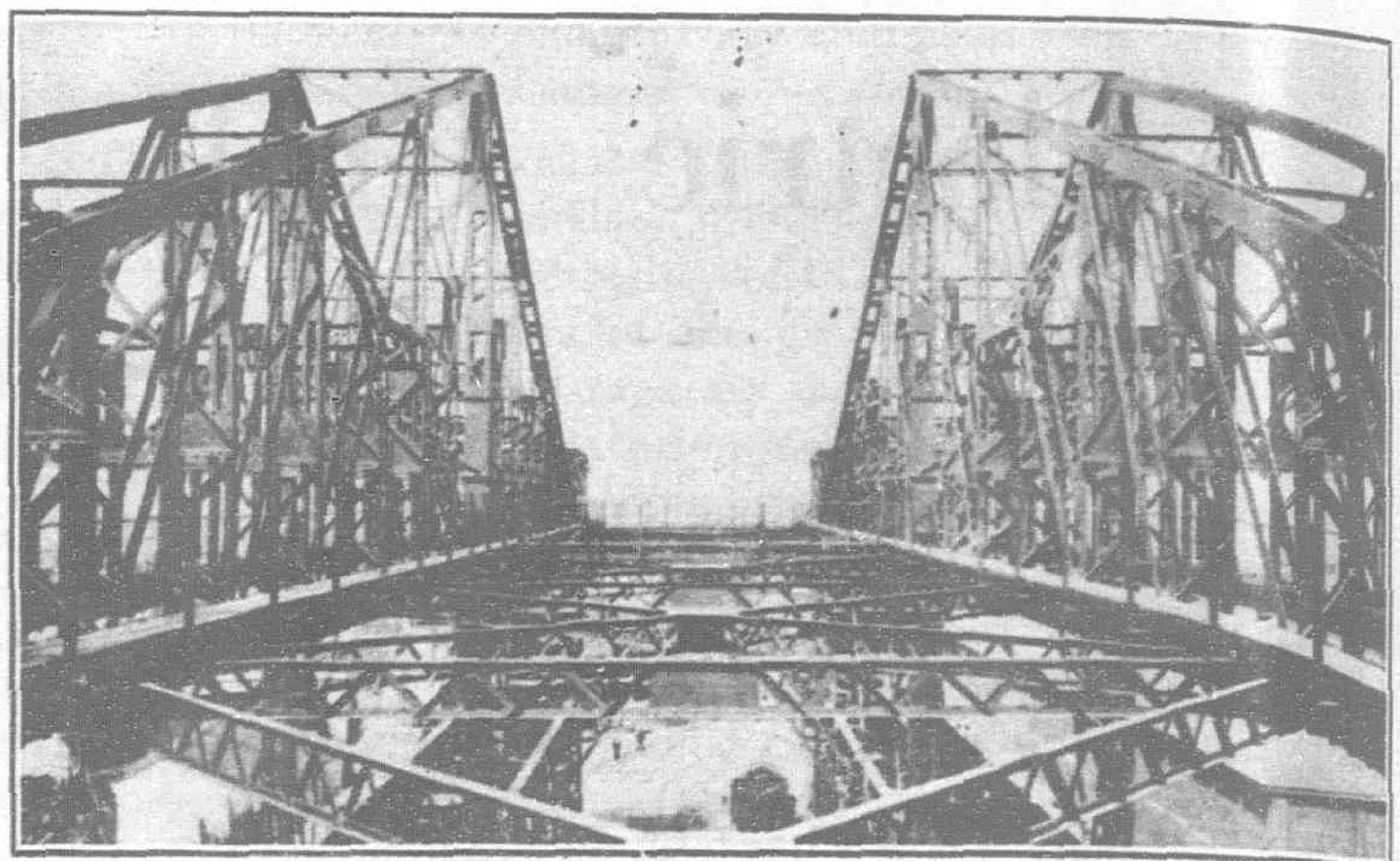
The Han-Yeh-ping Iron and Coal Corporation is the largest industrial undertaking in China, having a capital of over 60 million dollars, and finding direct employment for about 23,000 persons. The shareholders and management are entirely Chinese, although the Japanese have lent financial assistance on terms exceedingly advantageous to themselves. The writer joined the staff temporarily whilst installing the transporters described below.

The properties owned by the Company are situated along the valley of the Yangtze Kiang, and they contain all the raw products necessary for the production of iron and steel. The iron and manganese mines—and also the limestone and dolomite quarries—are situated in the Tayeh district of the province of Hupeh; the principal deposits of iron being in the Lion, Shark and Elephant Hills, all adjacent and connected to the river bank at Sz-hui-yai by 19 miles of standard gauge railway, also the property of the Company. These iron mines are worked on the open cast system, the total ore in the three deposits being estimated at seven hundred million tons. The writer thinks it possible that the three bodies mentioned may be huge outcrops of an enormous deposit at greater depth.

Coal Mines and Coke Making Plant

The coal mines and coke-making plant are at Pinghsiang in the province of Kiang-si. The seventy miles of railway from the collieries to Chu-chow on the Siang-Kiang—a tributary of the Yangtze—where the wharves are situated for shipping coal and coke to the ironworks, was also built by the Han-Yeh-Ping Company. Part of the line has since been sold to the government, and now forms a section of the future Hankow and Canton Railway, the completion of which will bring Hongkong within nineteen days post of London.

View from the Rear after Erection



Wind Bracing between Bridges

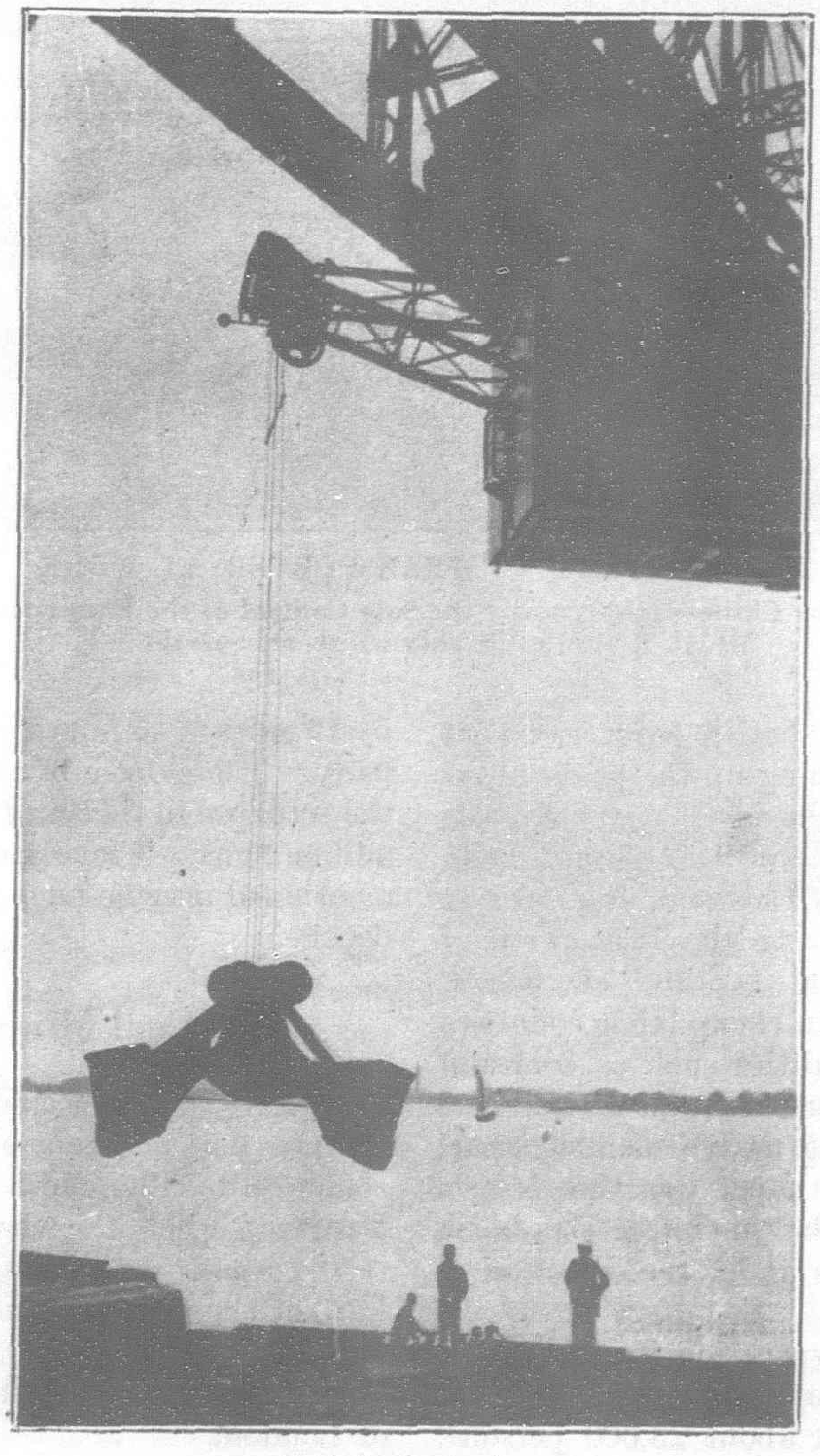
The original estimate of 500,000,000 tons of coal in the Pinghsiang district may be modified by later figures; but the present output of 600,000 tons per annum could easily be increased by the introduction of more modern machinery and local management. The blast furnaces, the steel-making plant and the rolling mills are situated at Hanyang on the confluence of the Yangtze and Han rivers, which place, speaking approximately, is about midway between the deposits of coal and iron. These iron and steel works are under the superintendence of Mr. Z. T. K. Woo, doctor of science and master of metallurgy, Sheffield University, a man of marked executive ability. He is ably assisted by his engineer, Mr. Kwauk, also trained at Sheffield and a graduate of the same University.

Steel Works Equipment

The works possess a fairly modern plant, consisting of four blast furnaces, seven Siemens-Martin steel furnaces, and a rolling mill which turns out plates suitable for shipbuilding and sections of all sorts up to 12-in. Rails are also rolled in fairly large quantities for the various railways in China. The older portion of the works is equipped with two blast furnaces each capable of producing 100 tons of pig iron per day. The newer extension has two 250-ton units, with turbo-blowers, turbo-alternators, and other details equally up to date. The steel is made practically from the raw material, as the only scrap available is the shearings from the output of the rolling mills.

The Ton-Tsu-pao Iron Works

The new ironworks now being built at Ton-tsu-pao, on the Yangtze close to the iron mines, are planned on a most ambitious scale. No less than eight 450-ton blast furnace units are projected, the first two of which are now being erected. The furnaces are of American manufacture, but the turbo-blowers for the furnaces and the turbo-generators for power purposes are being supplied and erected by the Fraser & Chalmers Engineering Works of London. The boiler installation is also of British manufacture (Babcock & Willcox). The mechanical appliances for unloading and loading the raw materials and finished products are being built in England.



Grab in Operation

All the ore, limestone, coal and coke for the Hanyang Works is carried from the Pinghsiang and Tayeh Wharves by the company's own tow boats and lighters, the total numbering 21 steam tugs and 180 lighters. The present output of iron and steel requires the unloading at the Hanyang Wharves of about 3,000 tons of raw material per day. Until recently this work was done by Chinese coolies, but the great rise and fall of the Yangtze river*—over 45-ft —was the cause of considerable trouble to these manual operations, especially in wet and wintry weather, and it was considered advisable by the Chinese management, in spite of the abundance of cheap labor, that it would be more economical to do this work by mechanical means.

Yangtze Difficulties

The decision entailed a plant of some magnitude to cope with the exceptional circumstances. When the river is in flood there is 25-ft. of water alongside the wharf, but at low-water about 100-ft. of foreshore is disclosed, and lighters can tie up no nearer than 130-ft. from the wall. This necessitated the building of cantilevers of considerable size and strength, capable of bearing large grabs at work 150-ft. from the face of the wall. The moving load is nearly 100 tons, and the stresses due to the operation of the grabs is severe, especially when the machinery happens to pick up the two 11-ton grabs simultaneously at full speed, whilst working at the extreme end of the cantilevers.

The cantilevers and anchor arms, together with the columns and bunkers have a weight of 530 tons. The total weight of the plant, including the grabs and machinery, is 680 tons. The four main bridge girders are 281-ft. in length, and 37-ft. in depth at the centre, each girder weighing approximately 100 tons. The bottom chord of the cantilever arms are 100-ft. above low-water mark.

When the grabs are working on the extreme end of the cantilevers there is an upward pull of 120 tons on the rear columns supporting the anchor arms, this being equal to 30 tons per column. The over-turning moment is safely counteracted by a continuous block of reinforced concrete, weighing 500 tons, which is laid under the four columns to act as foundation or loading as required. The six holding-down bolts to each column base are carried down and anchored to a grillage which embraces the loading in such a manner that no fracturing of the concrete could endanger the safety of the plant. Actually there is rarely any overturning effect, because the nest of bunkers, which are firmly fixed to the main and rear columns under each transporter, are seldom all emptied of ore at the same time. The total capacity of these bunkers is 1,000 tons of iron ore. They serve to prevent any stoppage of the grabbing operations due to the shunting of wagons, but need not be used necessarily as the grabs can discharge their load direct to the 30-ton bottom dump steel wagons when the latter are available.

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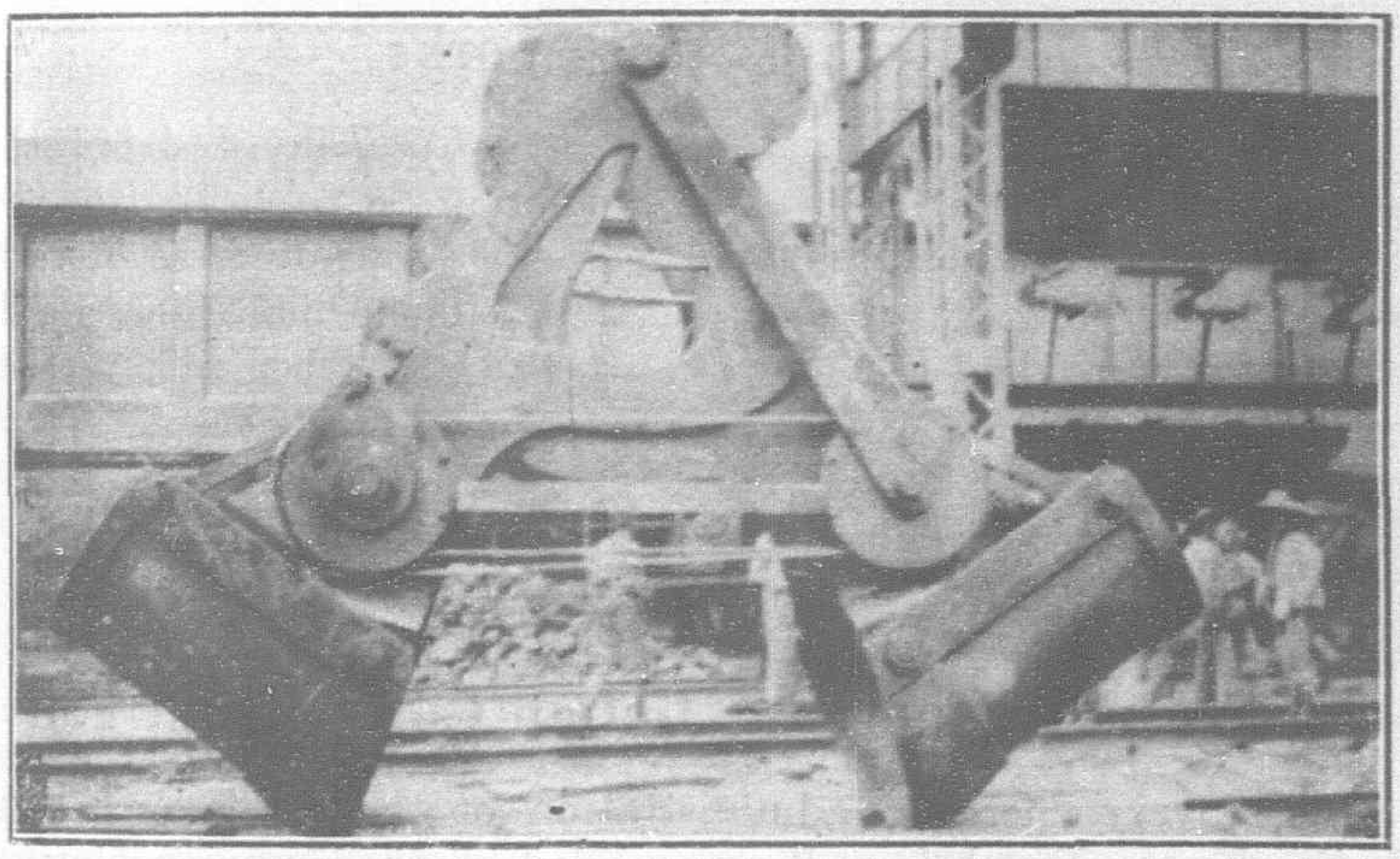
* The rise and fall of the river is not tidal, but is caused by the melting of the snow in the Himalaya mountains.

The maximum load on the four main columns is approximately 800 tons, or 200 tons per column. This weight is supported by a substantial concrete and stone-faced wall founded on the mud banks of the Yangtze. Considerable piling and grillage work was, of course, necessary to ensure stability, and the bank was afterwards well pitched with an apron of slag to prevent erosion. The writer made a careful examination of the work after the annual flood had subsided, and, so far as could be seen, the precautions taken were all that was necessary. The levels of the column bases were also checked without finding any settlement, unequal or otherwise.

Details of the Unloader

The unloader consists essentially of two transporters, 50-ft. between centres apart, braced together to act as one unit of great stability against wind pressure. Each transporter is fitted with a traveling carriage from which is suspended a crane capable of revolving 360 deg., whilst operating a grab weighing 7 tons when empty and 11 tons when full. The total weight of each grab and its attendant machinery is nearly 43 tons, so that the total moving load on the twin transporters, when the grabs are full, is almost 100 tons. The jibs which carry the rope sheaves for the grab ropes form part of the crane structure. Each grab is operated by four ropes, i.e., two closing and two dumping ropes, each pair being capable of acting as sustaining ropes. The under-hung portion with its grab and load is suspended from the centre of the traveling carriage by a large ball-bearing mounted on trunnions designed to ensure the weight being equally distributed on the four wheels of the traveler under all conditions of grabbing. As each grab is capable of traveling and turning a complete circle, the two working in co-operation can drop into any part of a ship's hatchway 90-ft. in length without moving the vessel. Or, when working separately, they can grab from two holds on smaller craft.



Traveling Cabin and Grab

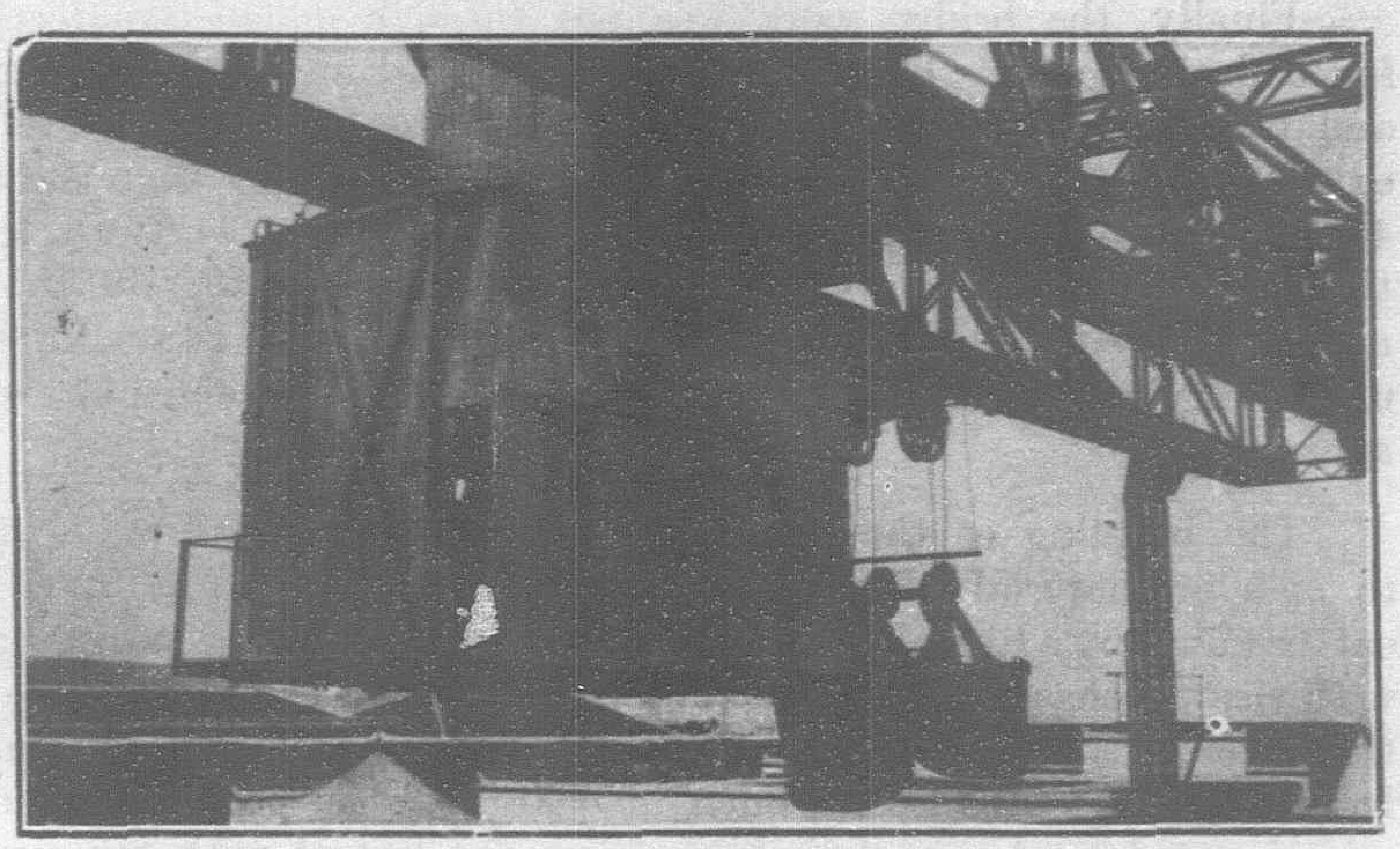
The Electrical Equipment

The hoisting, traveling and slowing machinery is driven by separate electric motors, each set being controlled by one man, who travels in the machinery cabin with the grab, so that he has always a complete view of the operations.

The total power called for by the motors on the transporter is equal to 500 B.H.P. This is drawn from a turbo-alternator working close to the blast furnaces, where the boilers generate steam by burning the waste gases from the furnaces, and a small coal fire for auxiliary and ignition purposes. The high tension current from the alternator is converted by a rotary converter, fixed near the transporter, to 440 volts direct current, and is transmitted to the collectors on the traveling carriages by copper mains suspended the full length of the bridges by ears fixed to the underside of the cross-bracing.

The 170 B.H.P. hoisting motors are of the series-wound interpolar semi-enclosed type running at 600 revs. per min., which gives a rope speed on the drums of 190-ft. per minute. The automatic circuit-breakers were set to 318 amperes, and in all cases where they came into action on peak loads, the grabs were held instantly by the powerful solenoid brakes provided for the purpose. Even when the maximum load ran full-speed into the hoisting limit switches the result was the same, the motor being disengaged from the gearing just a fraction of a second before the brakes gripped. The traveling motors are of similar type 65 B.H.P. (115 amperes), and are geared to move the traveling carriage at a maximum speed of 740-ft per minute.

The 15 B.H.P. slowing motors can turn the grab through 360 deg. in 36 seconds, this being equal to a speed of 200-ft. per minute when measured at the maximum radius. The electrical control and brake gear supplied with the slowing motors was altogether too fierce in its action of starting up and shutting down for the work which had to be done by the mechanical portion and it was necessary to rearrange this on the site until the results became satisfactory.



Rear View of Grab, Weight of Empty Grab, 6 tons

Details of the Switchgear

The switchboards are placed in the lower cabin close to the controls so that the driver has command of all the instruments without moving from the footplate. Besides the usual power and lighting switches, hand-guard fuses and meter dials, the panels are fitted with automatic overload and limiting circuit-breakers, which bring all operations to a standstill without damage to the plant in the event of sudden incapacity befalling the driver. The difficulty of connecting the main leads from the trolley wire collectors on the traveling carriage to the rotating switchboard in the machinery cabin underneath was overcome by fitting revolving contactors over the centre of the ball-bearing races, and passing the internal wires down the hollow centre designed for that purpose.

The whole of the erection work and foundations was carried out by Chinese labor, the writer being the only European on the site.

Difficulties of Erection

The erection of the structure presented several unforeseen difficulties, because the material was shipped from England at the time when the minister of munitions prohibited the export of steel. The contractors (The Fraser & Chalmers Engineering Works) made every effort to complete the plant, but a number of the smaller details and all the tools for erection had to be short-shipped. Making the tackle in China entailed a lot of work, the biggest job being the construction of two traveling derricks with 50-ft. jibs, capable of handling 5 tons each, so that the corbelling of the two cantilevers could proceed simultaneously. A lattice steel mast, capable of lifting 5 tons to a height of 65-ft., together with all the purchase tackle necessary and three double-geared hand winches, were also made on the site. These tools were built whilst work on the foundations was in progress, and the tackle required first was completed in good time to commence work on the superstructure.

After the columns and bunkers had been erected the timber falsework was built up from the latter to carry the bottom booms of the anchor arms. No special timber could be purchased for the falsework on account of the war shortage, but fortunately the sleepers required for the trackwork round the plant and lines leading to the furnaces arrived, and were utilized for the purpose with good and economical results. The work of driving 75,000 ⅞-in. steel rivets on the site by Chinese labor was completed without difficulty, although a larger percentage failed to pass inspection, and had to be cut out, than is usual at home. But the final work was creditably done.

Deflection Tests

Finally, the bridge work was put through exhaustive tests for deflection, etc. The test load was moved along the bridge and readings taken at each vertical until the load reached the extreme end of the cantilever, where it was allowed to remain 40 hours before the final readings were taken at the verticals as the load was returned to the end of the anchor arm. By this means each panel and the nose of the cantilever showed 24 readings under varying conditions, with a like number at the centre of the anchor arms.

The building of the plant was completed without accident to men or material. This immunity was accounted for, in the native mind, by a liberal sprinkling of the water under the cantilever with rice purchased by general subscription of the gang to appease the water gods. This unusual method of insurance on one occasion led to fighting, because the man in charge of the pontoon—who was deputed to do the sprinkling—was too liberal with the rice around his own craft. The plant went to work without a hitch after the Chinese chosen as drivers had learned how to manipulate the controls, which they did rapidly.

Owing to the grabs having to be hoisted 75-ft. at each lift when the river is low, and then travel from the end of the cantilevers to the bunkers and back, a total movement of 650-ft. for each grabbing without reckoning the slowing movements and the smallness of the craft necessary to suit the river conditions, the rate of unloading is not so rapid as would otherwise be the case. The machinery is designed to unload 100 tons of iron ore per hour with each grab when working on ocean-going steamers, or craft of equal capacity ; but the best results obtained by the Chinese drivers when unloading the small lighters was 700 tons with one grab in a working day of 10 hours.*

When the writer left China the plant had unloaded 270,000 tons of ore, coke, coal and limestone without an accident of any kind, and travelers from England to Central China were somewhat astonished to find unloading appliances there equal to anything that could be matched against them by any similar undertaking in Great Britain.

In conclusion, the writer would like to make a point of the fact that an important undertaking under Chinese management and in China, where labor is plentiful and cheap, have found it worth while, after a lengthy trial of manual labor, to replace the coolie by a mechanical contrivance for unloading material in bulk.

The Chemical Industry in Japan

Dr Takamatsu, director of the Tokyo Industrial Laboratory, in a official bulletin, says that it is necessary to establish a large government laboratory where the necessary experts can be trained if Japan is to hold her own in developing her chemical industry. Before the war, writes Dr. Takamatsu, Japan had to import most of her dyes and chemicals, especially from Germany. During the war the law for the encouragement of the dyeing and chemical industries was passed, and in 1916 the Japan Dye-Stuff Manufacturing Company was established. Lack of funds and expert workers has hampered the activities of the company. Last year the imports of dyestuffs were very large, and they are, judging from prevailing conditions, likely to be much larger this year. During the war numbers of dyestuff works were started in various parts of Japan, but nearly all have disappeared since the depression set in. Those that still hold on are working on a very small scale, and have no permanent plans of business. The chemical industry, which is of so much importance to Japan, cannot be developed on such narrow lines, and the assistance of the government in the drection already indicated is urgently necessary. The Japan Dye-Stuff Co., it is reported, is contemplating the engagement of dye experts from Germany. Such a plan may also be adopted by other chemical works in the country, which feel the necessity of a thorough reform of the industry.

Horton Steel Works

The Canadian Chicago Bridge & Iron Company, Ltd. of Bridgeburg, Ontario, announce a change of corporate name to HORTON STEEL WORKS, Limited in honor of the late Horace E. Horton who founded the organization in 1865. Their main offices and works are at Bridgeburg, Ontario, where C. H. Scheman is general manager and Mr. C. C. Gregory is the manager of the plant. Their eastern sales office is at 260 Saint James Street, Montreal, Quebec, where Mr. G. S. Sangdahl is the district sales manager.

The Third Netherland Indian Commercial Fair

The very energetic administration of the Netherlands East Indies by the Dutch is well exemplified in the commercial fairs they have had in the past and in the one for which extensive preparations are in progress, to be held at Bandoeng (Java) in the second half of 1922. It is stated that the fair will have an entirely international character and it is intended not to make any restriction as regards the kind or the origin of products and commodities to be exposed. The government of the Netherlands East Indies have intimated that the fair being planned will be of greater proportions than its predecessors and that it will undoubtedly also surpass them in commercial importance. It will no doubt afford an excellent opportunity for all intending exposers of Far Eastern products.

Jeffrey Material Handling Machinery

The Jeffrey Manufacturing Company of Columbus, O., have just issued a new Price Catalog, No. 350, a handsome, well-bound book of over 200 pages, covering the many varieties of machines for the handling of heavy materials for many purposes and largely utilized in the cane sugar industry. The book contains illustrations, price lists and dimensions of Jeffrey chains, sprockets, conveyor and elevator details, transmission and gears. Illustrations and descriptions of their standard line of elevating and conveying machinery for every industry, complete coal handling equipments for boiler houses and tipples, mining machinery, such as coal cutters, crushers, pulverizers, shredders, portable loaders, etc. Those interested in such work can secure copies of the same by addressing the Jefferson Manufacturing Co., Columbus, Ohio.

Bridge Building in the N.E.I.

The Railway Bridge Across the River Serajoe on the Cheribon-Kroja Line of the Dutch East Indies Railways

THE bridge, represented by Fig. 1, was projected by Dr. Ir. J. H. A. Haarman, chief of the constructional department of the state railways in Java; it was constructed by the factory "De Pletterij te Delft, Holland" and erected by the staff of the constructional department. The bridge was finished early in January 1916.

The total length is 863 feet (263 M'), the spans are:

82 + 207 + 295 + 207 + 82 feet
(25 + 60 + 91 + 60 + 25 M')

The central part with a length of 229 feet (213 M') forms a connected but statically determinate system; to the arched bridges with a tension-chord, bridging over the side-spans, consoles have namely been added towards the centre, on the ends of which rests an arched bridge with a tension-chord of 233 feet 3¼ inches (71.1 M') point of support distance, see Fig. 2.

The bars situated opposite to the bearings near the bearings of the inserted central span have performed their function during the erection, see Fig. 3, and after getting ready have been altered in such a way as not to convey stresses any more.

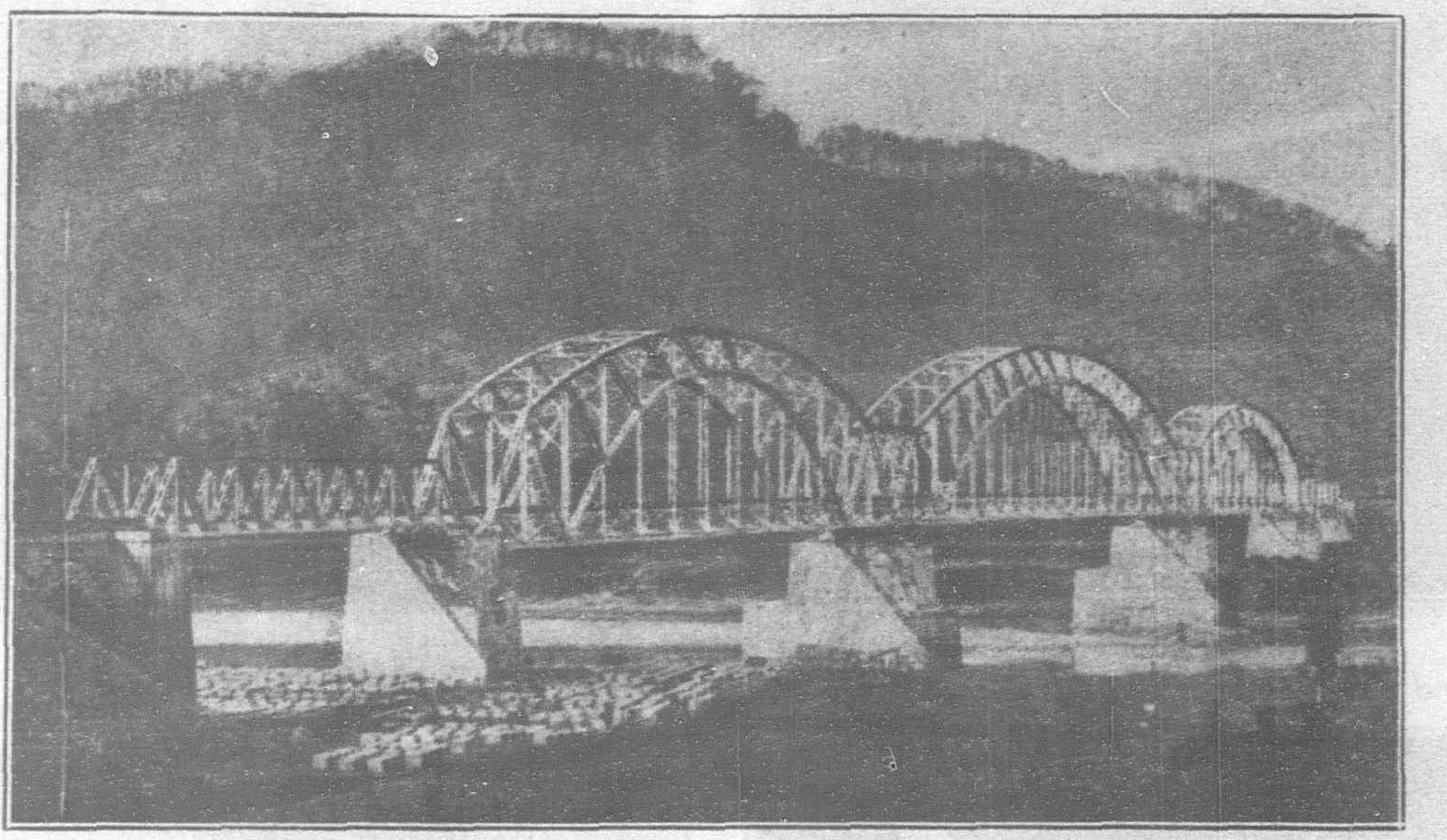


Fig 1. Railway Bridge over the Serajoe River, Java

About the design and the way of erecting ample information has been furnished in the designer's work entitled: "The large Railway-bridges in the road Cheribon/Kroja of the State Railways in Java," published by J. de Boer at Tegal.

As particulars of the design may be mentioned among others

(*a*) the peculiar bar-scheme of the arched bridges with tension chord of the side-spans as is shown in Fig. 2;

(*b*) the junction of the stringers and the floor beams constructed like frame-work, where the stringers have been built into the floorbeams;

(*c*) the way of the bearing of the inserted central span of 71 M' on four movable bearings and the fastening of this span occurring there to one of the side-spans by means of a bar connecting two points of junction of the respective lower wind-bracings and conveying not moment but only forces in the longitudinal direction of the bridge, among others braking-forces;

(*d*) the end portals of the inserted central span, which have been constructed in such a way as to convey the forces of the upper wind-bracing of the central span to the

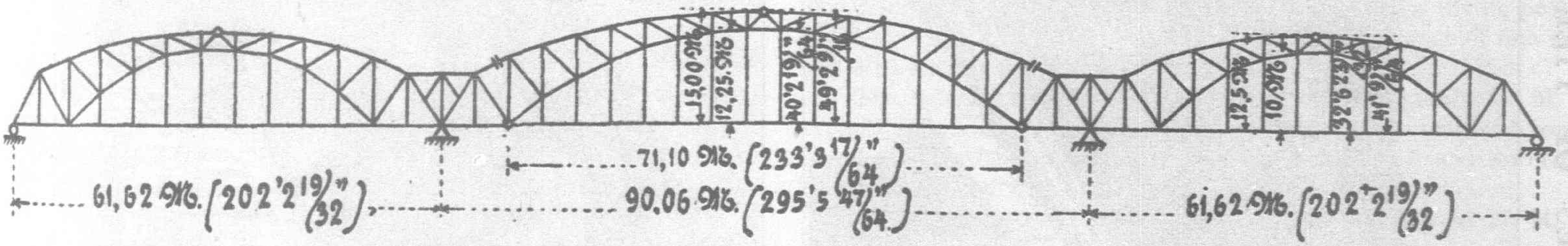


Fig. 2.

The load, upon which the bridge is calculated, consists of two locomotives and an indefinite number of wagons of the scheme sketched here: while moreover the regulations of the state railways of the year 1911 were acted up to.

The weight of the arched bridges is 571 (580) tons, namely two side-spans with flanges each 187 (190) tons and the inserted central bridge 197 (200) tons.

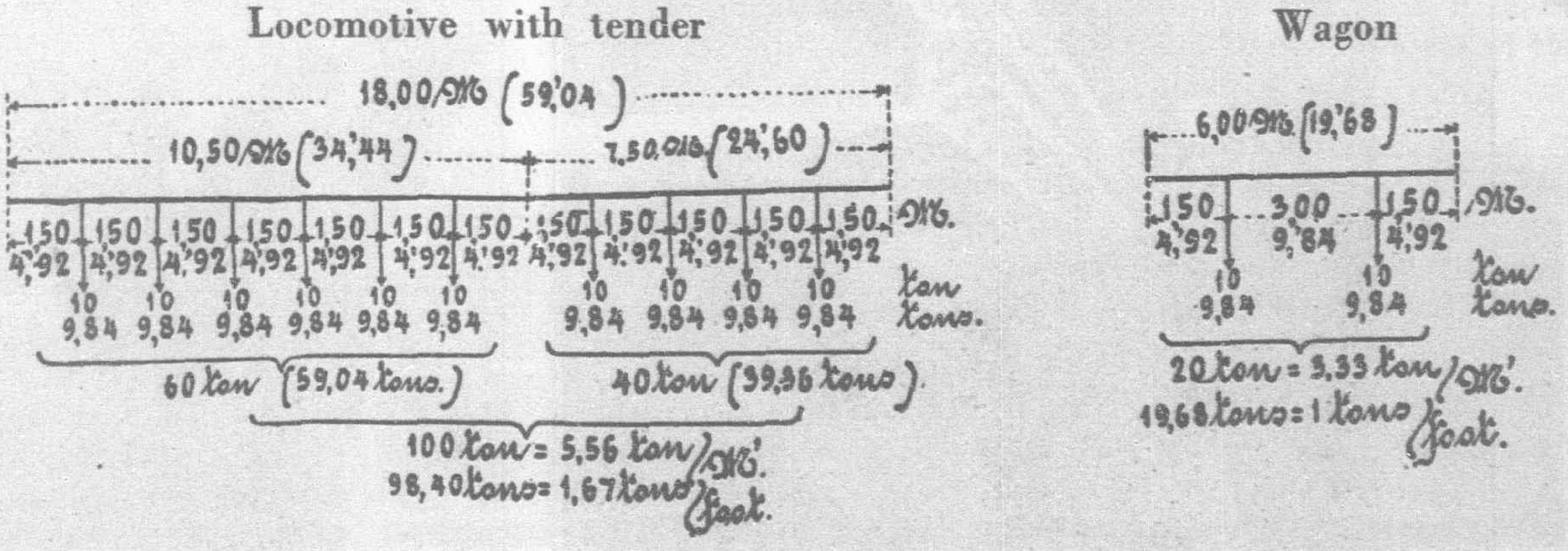
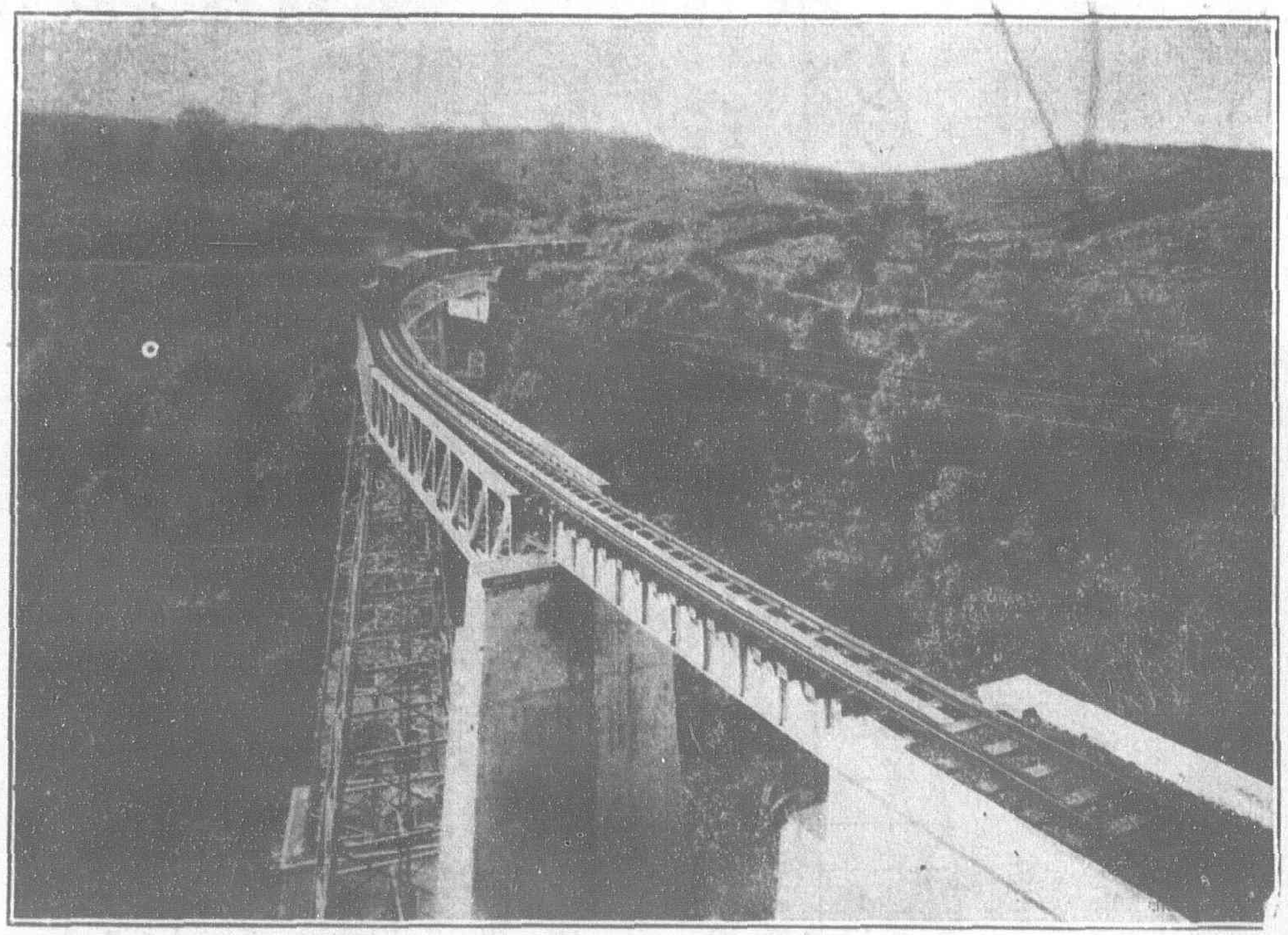
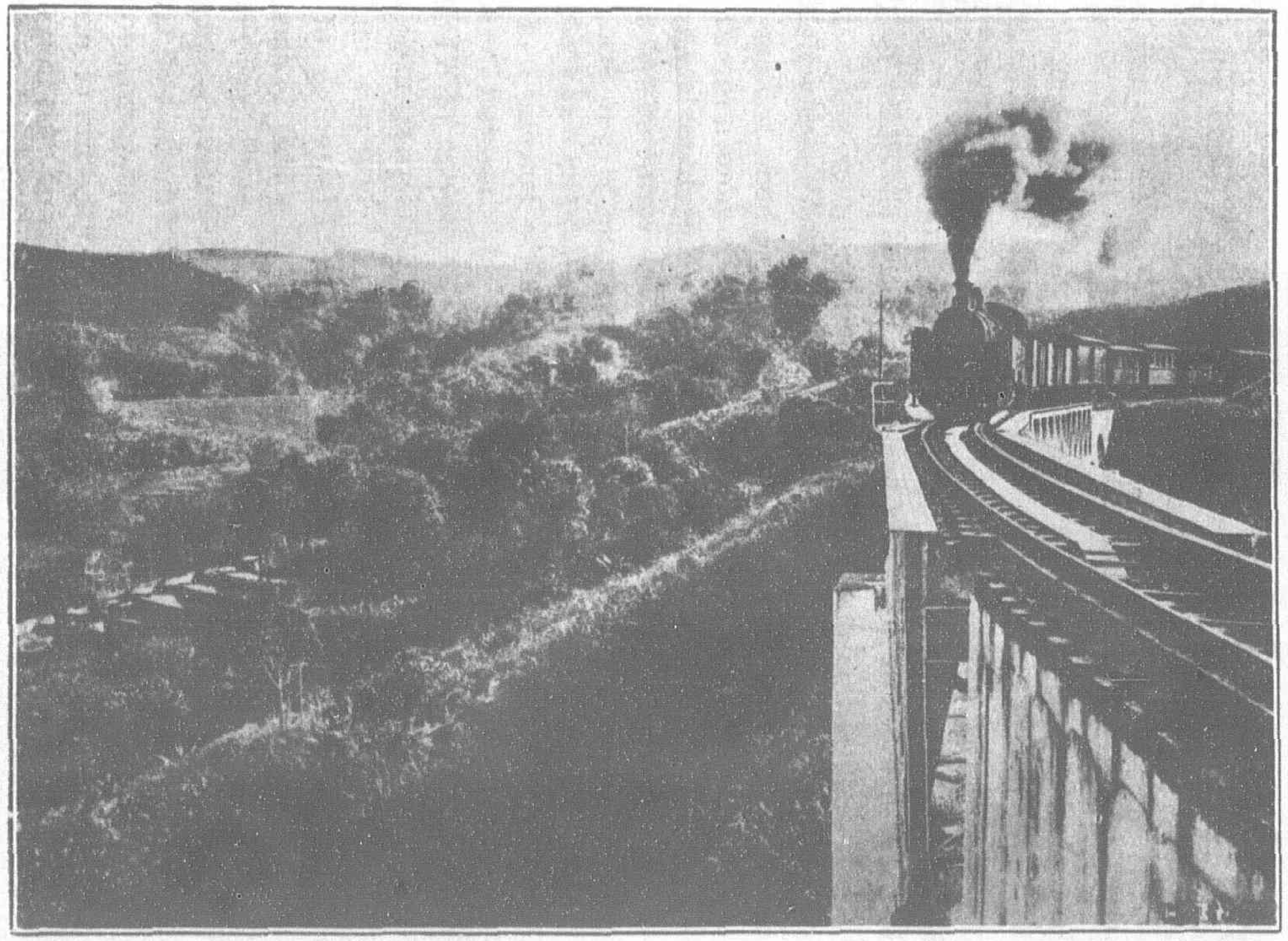
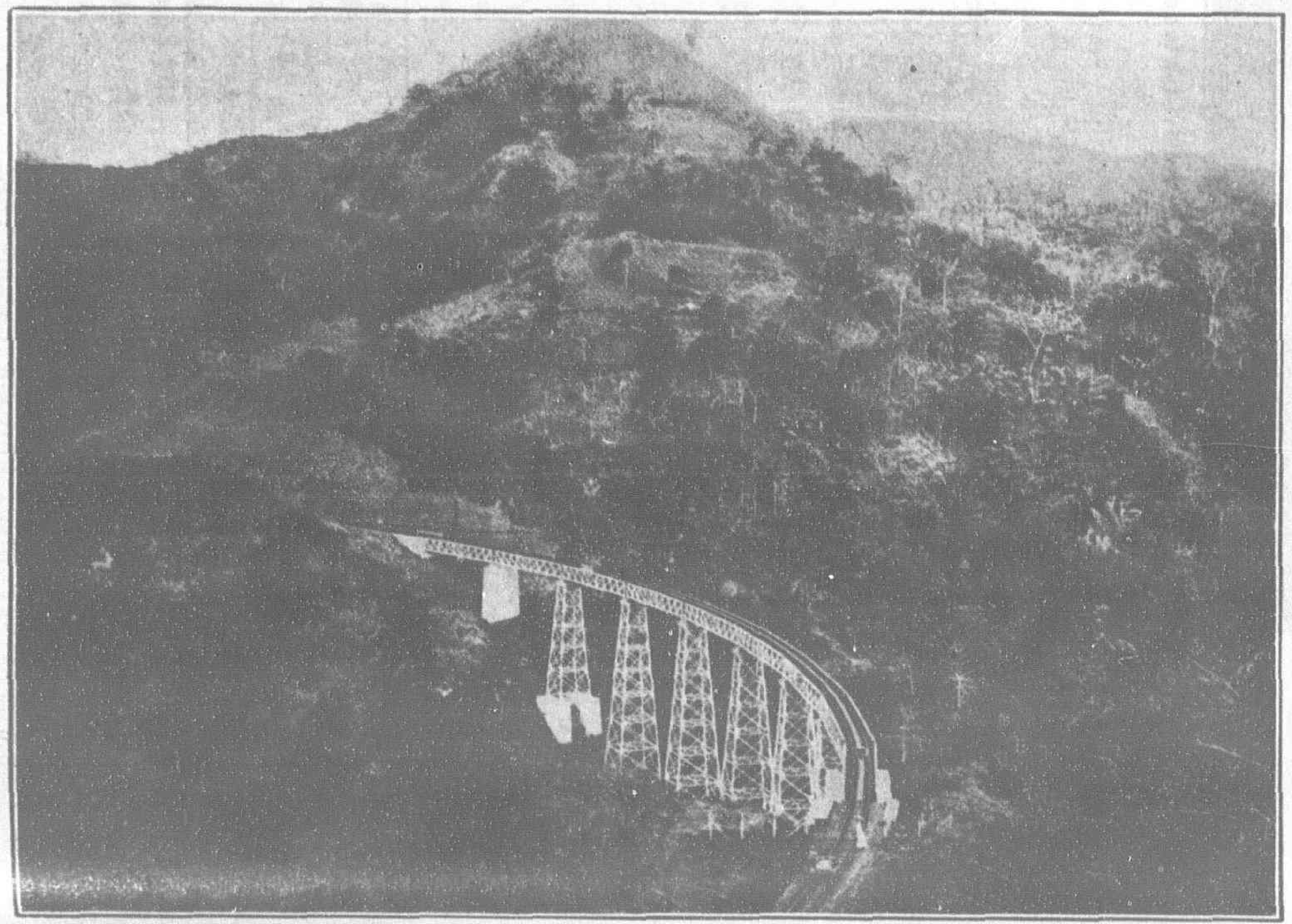


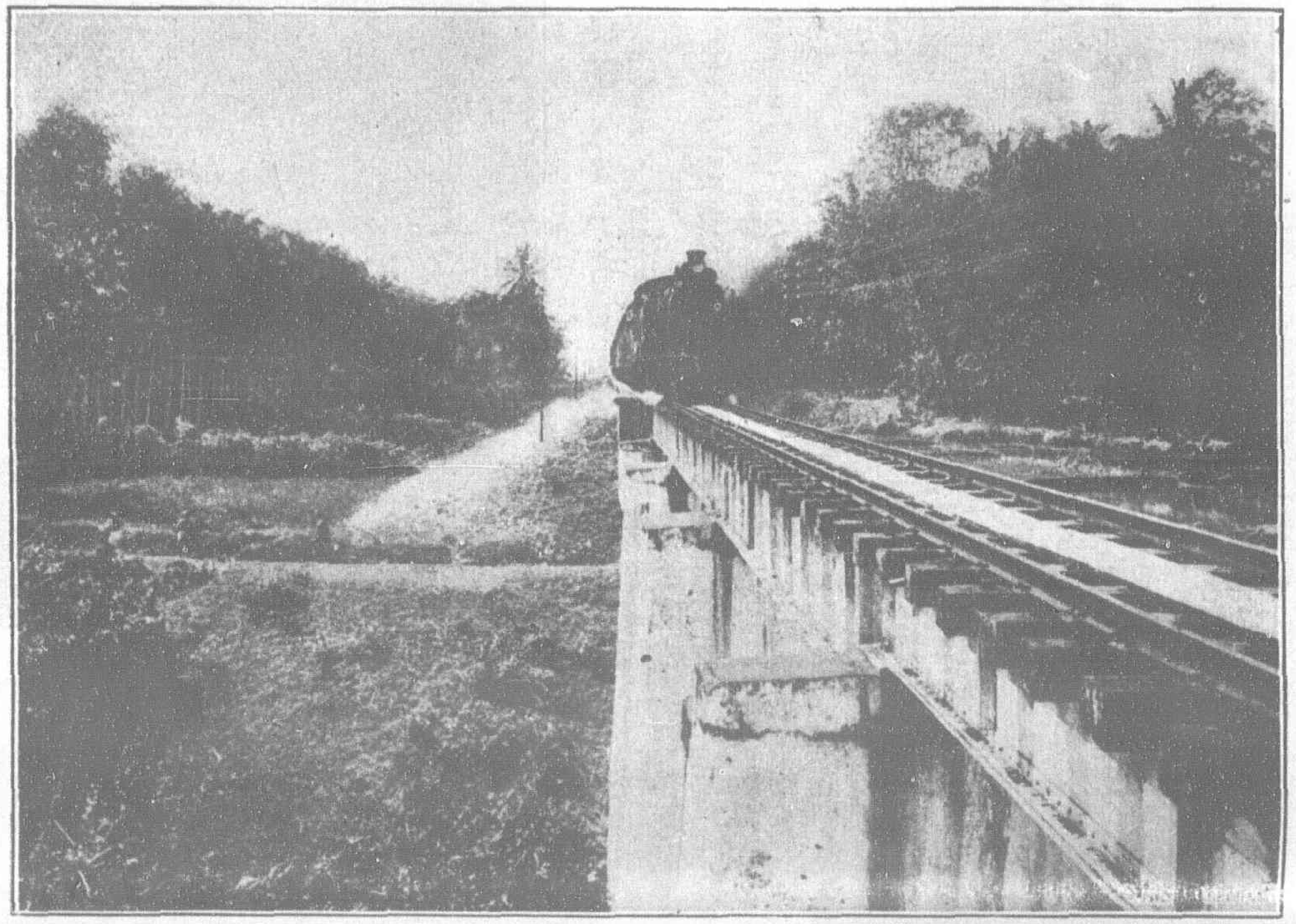
Fig. 3.

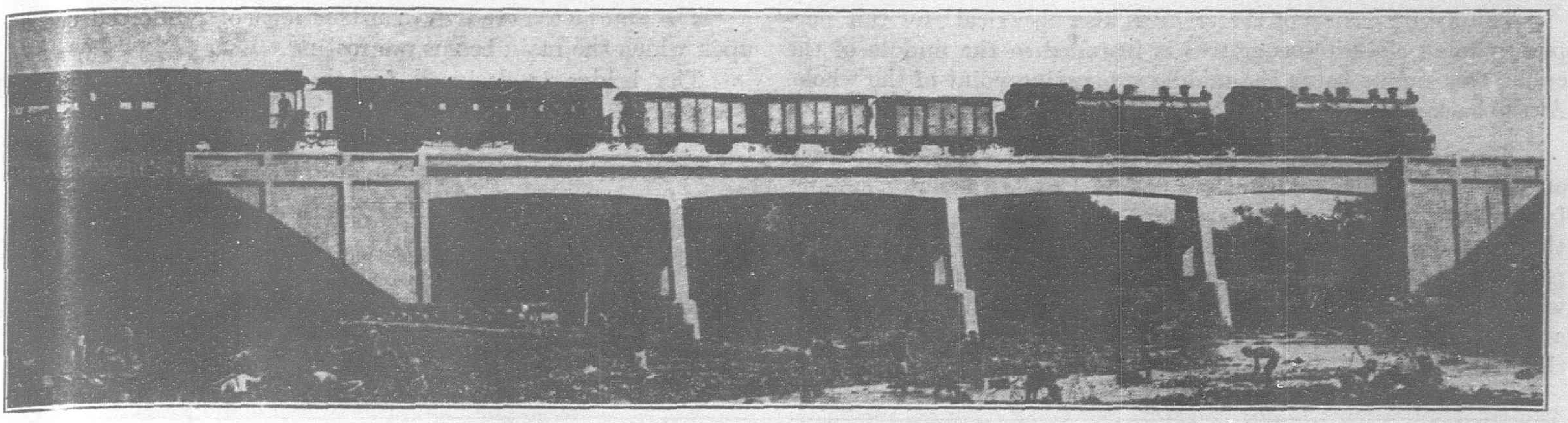
TYPES OF PIER BRIDGES ON THE N.E.I. STATES RAILWAYS











Reinforced Concrete Bridge over the Proepoeck River

bearings, without touching the trusses of the flange of the side-span, and to make possible a free change of angle of the inserted span with regard to the side span at the same time.

The erection of the bridge is remarkable in connection with the circumstance that the bridge has been built out on both sides and the designer felt so sure of an accurate erection that he had all the bars, so also those of the central field to be inserted at length, made fit to all the bolt-holes at the right measure before, and when building, really succeeded in inserting those bars of the central field perfectly fitting without even having to use a broach.

In the erection only Javanese workmen worked under the direction of Indo-European people all of whom had got their training in the service of the state railways at the constructional department.

The staff displayed an extraordinary desire to work quickly and well, the consequence of which was the completion of the erection of the superstructure in three months.

The money spent on this bridge is mentioned roughly below :

Purchase iron construction 659 (670) tons with transport		*f* 127,300
Preparatory work, false-work bridges of the side-spans...	*f* 20,844	
Installing and riveting of two bridges of 82 feet (25 M') width	*f* 765	
Installing and riveting of the arch bridges	*f* 2,1920	
Finishing permanent way, clearing work	*f* 5,050	
		f 48,579
	Total round	*f* 176,000

For bridge of 670 tons

So purchase per ton *f* 190. Erection *f* 72.50

Total ... ... *f* 262.50

Pier-bridges in the Line Bandjar-Parigi

In the line Bandjar-Parigi the ravines of the Tjipamottan, the Tjipembokongan and the Tji-keboejoetan are crossed by pier-bridges, respectively 310 M., 299 M. and 176 M. long. The height of the rail above the bottom of the ravines is respectively 38, 40 and 34 M. The bridges were planned and built by the construction department of the state railways and calculated on the load-diagram 1911 (see communication on the Serajoe bridge).

The piers are 12.09 M. long, measured along the centre of the track.

The are supporting bridges with a length of 12 M. and on either side bridges, 21.20 M. wide.

The total weight of piers and bridges is for :

the Tjipamottan	689 tons
the Tjipembokongan	644 tons
the Tjikeboejoetan	310 tons
One bridge 12 M. long has a weight of	7.52 tons
one 21.20 M. long of	20.7 tons

One pier of 4 stages has a weight of 34.23 tons, one of 6 stages of 47.44 tons and one of 8 stages of 63.70 tons.

The bridges of 20 M. are light, as the upper girder works at the same time as longitudinal beam. The piers have between the supports a connection, whereby the secondary tensions are almost absent.

The erection took place for these bridges in the usual manner by building first the nearest pier by means of a crane and by lowering the bridge of 12 M. by same. Afterwards the end of the crane was catched above the newly built pier and supported, the bridge of 21.20 M. then being lowered between this pier and the one before built.

After the laying of the track, the crane was moved ahead.

This crane is 80 M., 32 M. long, of which can project out freely. The free end can support a load of 6 tons on one traveling crab. The crane is provided with two traveling crabs with a lifting power of 12 tons and two fixed winches with a lifting power of one ton installed ahead nearly 6 M. from the end.

The velocity of lifting and lowering is for the crabs 1.5 M. a minute for a load of 12 tons and 3 M. a minute for a load of 6 tons. The fixed winches are lifting a load of one ton in 5 and lowering the same load in 3 M. a minute.

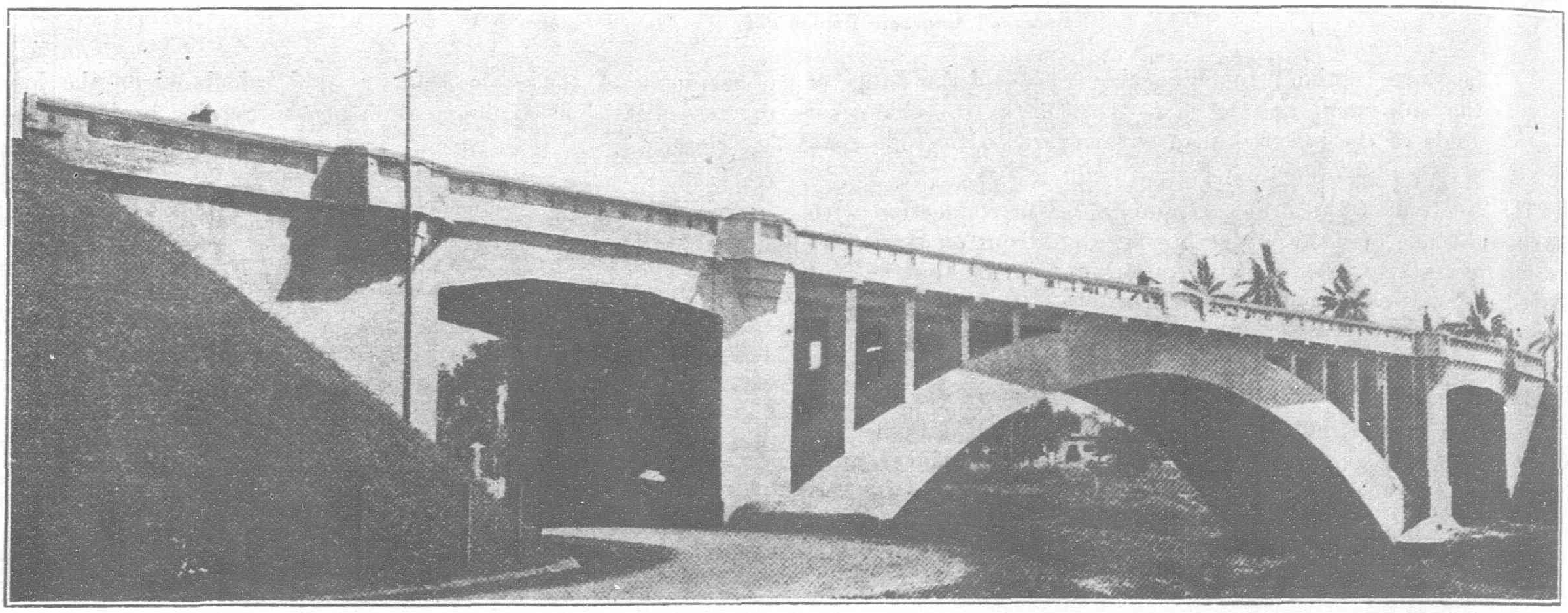
The crabs have a maximum horizontal velocity of 20 M. a minute.

All movements take place electrically for the purpose of which an electric central-station with a benzine-motor of 20 H.P. and a dynamo of 52 amp. and 220 volts is erected on the back-end of the crane.

Reinforced Concrete Bridge over the Kali Belang

The manipulation of the crane is also electrical; for this purpose a small electric locomotive is installed in the middle of the crane, this engine being the middle supporting point of the whole. At the back-end are two traversing wheels.

The gauge of the crane is the same as for the normal track of the state railways, namely 1,067 M., while the outer circumference of the crane remains within the profile of free space, so that the crane can wholly be conveyed along the straight open parts of the line. The maximum velocity is then 5 M. a minute, when conveyed along other parts of the line and over bridges and through tunnels the crane is taken apart into five pieces and the electric central-station is also dismantled.



Reinforced Concrete Railway Viaduct, Java

The costs of the crane with the auxiliary implements were—erection included—*f* 33,000.

The time spent for the erection was for:

the Tjipamottan	... ...	5 months
the Tjipembokongan	... ...	5 months
the Tjikeboejoetan	... ...	3 months

On an average were erected two piers of 8 stages and two bridges in one month.

The costs amounted:

For the Tjipamottan with a weight of 689 tons, for buying to *f* 97,725, for erecting to *f* 27,000 for the Tjipembokongan with a weight of 644 tons, for buying to *f* 86,300, for erecting to *f* 27,000 for the Tjikeboejoetan with a weight of 310 tons, for buying to *f* 49,900, for erecting to *f* 14,000.

The Reinforced Concrete Bridge Across the Kali Proepoek in the Line Cheribon-Kroja

The girder bridge, in total 74 M. long, consisting of four spans of 12+14+14+12 M. was built as well as the bridge over the Kali-Belang in the years 1915-1916, of reinforced concrete in connection with the war condition.

The bridge contains about 430 M^3 of reinforced concrete and was planned and built by the construction department of the Neth. East Indian state railways for the sum of *f* 44,000, inclusive the costs of supervision.

The cross-beams of reinforced concrete have been erected on piers of concrete, which have been reinforced in connection with the often appearing heavy "bandjirs" (floods.)

The abutments are light constructions of reinforced concrete, upon which the main beams are resting.

The bridge is designed for the loading-specifications 1911 (see communication on the Serajoe bridge).

The Reinforced Concrete Railway-bridge Across the Ravine of the Kali-Belang in the Line Cheribon-Kroja

The bridge, planned and built by the "Dutch Company for works in reinforced concrete" was made in the war years 1915-1916, in connection with the difficulty to get steel bridges.

This is the first great railway-bridge made of this material, built for the state railways in Neth. East Indies.

The total length of the bridge is about 207 M. There are 23 spans of 9 M. on slender cross-beams of reinforced concrete of a height from 8 to 25 M. In the middle a dilatation joint is made with a cross-beam on either side. According to this the construction is divided into two continual layer-bridges of a length of ± 100 M.

The work contains, besides a quantity of 700 M^3 of rubble-masonry, of 1,790 M^3 of reinforced concrete, wherein 243 tons of reinforcing iron is used. The costs amounted to *f* 175,400.

The bridge is calculated according to the loading specifications of the state railways, fixed in 1911 (see communication about the Serajoe bridge.)

The Reinforced Concrete Railway-bridge over the Tjiliwoeng the Line Meester-Cornelis-Manggarai

The bridge arranged for double track—see Fig. 1—was planned by the construction department of the Neth. East Indian state railways in the years 1916-1917 and built under own management.

The total length is about 78 M. The middle part, spanning the Tjiliwoeng, is planned as arch bridge with a theoretical length of 38 M. and an arch height of 6.65 M. while the sidespans, 8 M. wide cover the streets.

The load for which the bridge has been designed, consists of two locomotives and an indefinite number of cars of the following scheme:—

The bridge contains about 2,400 M^3 of reinforced concrete and 900 M^3 of masonry in rubble and was built for nearly *f* 120,000.

The Chefoo Harbor Works

THE official opening of the Chefoo harbor works on 14th September, brings to a close one of the most interesting engineering projects for the improvement of an old Chinese open port. Opened to foreign trade in March 1862, the port of Chefoo was most unsafe, the anchorage being exposed to the prevailing winds and heavy storms, occasioning much loss to shipping and cargoes.

After 1900 the "Breakwater Scheme" was taken up seriously by the foreign chamber of commerce, and the Chefoo harbor improvement commission was formed in May 1913, consisting of the superintendent of customs as chairman, a representative of the consular body, the commissioner of customs *ex-officio* treasurer, and the chairman of the foreign and Chinese chambers of commerce. The breakwater surtax, to cover the cost of constructing the harbor works, was put into operation on 1st July, 1913, and expert advice called in. Arriving in October 1913, Mr. O. C. A. van Lidth de Jeude and Mr. B. van Exter, as assistant engineer, studied the harbor conditions and in April 1914 final plans for the improvement of the port were presented. In the same month these plans were finally submitted to the authorities in Peking, and duly approved in February 1915, when at the same time the raising of the necessary loan was authorized.

The project embraced the enclosing of a large area water (about 250 acres) by the construction of a breakwater and a mole.

The following works had to be made :—

1. An eastern breakwater, 2,600 feet long, providing an entrance at either end, the northern entrance between the breakwater and the mole and one at the southeast corner between the breakwater and tower hill.
2. A western mole, 5,873 feet long with a quaywall 600 feet long on the northern arm of it.
3. Dredging of a great part of the shelter formed by the breakwater and mole to 20 feet below Chefoo zero, which means 22 feet at mean low water. An area of 900 feet by 450 feet near the breakwater to be dredged to 25 feet below C.Z.

On the 20th March, 1915, the C.H.I.C. asked for tenders for the loan and construction, either as separate or combined transactions. On the 1st June the covers were opened and out of four, the one from the Netherlands Harbor Works Company of Amsterdam was accepted for the sum of Hk. Tls. 2,677,000 (about Mex. 4,000,000) the cost of the breakwater being Hk. Tls. 1,157,079.-71, of the mole with quaywall, Hk. Tls. 1,352,553.18, of the dredging in the shelter Hk. Tls. 101,190.60 and of sundry expenses Hk. Tls. 66,176.51 (in consequence of the typhoon of August 1917 some modifications in the construction of the mole were agreed upon, towards which the C.H.I.C. paid Hk. Tls. 110,000.00. Some additional dredging works at the approaches to the harbor cost another Hk. Tls. 55,000.00).

As no offer for the loan was received, an arrangement was made with the Russo-Asiatic Bank for an overdraft, guaranteed by the revenues of the surtax. Beginning with April 1918 the commission received a loan from the surplus of the customs revenue, to be repaid with the entire proceeds of the surtax until finally redeemed. On the 9th June, 1915, the contract for works was signed and actual work started in August. According to the contract the works had to be carried out in four years but in consequence of the typhoon in August 1917 and modifications of the plans the time for the completion was extended by eighteen months. In September 1915 Mr. C. Rickard was appointed engineer-in-chief.

Breakwater.—The type of the breakwater is that of a rubble foundation with a superstructure wall, the lower part being constructed of blocks in masonry set in regular order and the upper part of monoliths in masonry built *in situ*. The total height between the base of the foundation mound and the top of the parapet of the breakwater is 51½ feet. The width of base of foundation mound ranges from 117 feet to 133 feet.

The principal dimensions and levels for the breakwater are :

Total length: 2,600 feet, level of top of foundation: 20 feet below Chefoo zero (Chefoo zero is about 1.8 feet below mean low water); level of top of breakwater (without parapet): 18 feet above C.Z.; level of top of parapet: 21½ feet above C.Z.; width at top of blocks: 30 feet; width at top: 26 feet; width of parapet at base: 7 feet; width of parapet at top: 6 feet.

The two circular heads of the breakwater are formed for the lower part by reinfoced concrete caissons each 50 feet long, 40 feet wide and 25 feet high, and the upper part by monoliths of masonry work. The large breakwater blocks were set by divers to a slope of 75 degrees with the horizon, in three rows built up of blocks, of 32 and 24 tons each. Upon the outer berm of the rubble mound, where the exposure to wave action is greatest, blocks of masonry weighing 3 tons each were placed in regular rows to protect the rubble mound at the foot of the upright work. All the blocks were built in the blockyard at the West Beach, transported on trucks to a block loading jetty and loaded on to iron lighters. Floating cranes were used for depositing the breakwater and berm blocks. The caissons were built on a slipway and launched. When completed afloat they contained each 250 cubic yards of reinforced concrete and drew from 10½ to 11½ feet. Stairs were made and ladders affixed on the inner face of the breakwater. Two light towers have been erected on the heads.

Mole with Quaywall.—The mole, which is connected with the shore, consists for the lower part of a mound of sand covered by brushwood constructions known as "zinkstuks" and ballasted by rubble. The above low water work is constructed in rubble. The superstructure is surmounted by a parapet of masonry. Upon the crown a macadam road and railway track were laid.

The Quaywall on the northern arm is constructed in a similar way as the breakwater of blocks in masonry, with a backing of rubble. Each end of the quaywall is formed by a caisson of reinforced concrete containing 167½ cubic yards reinforced concrete. Fenders, ladders and bollards have been provided. A light tower upon the end of the mole has been placed.

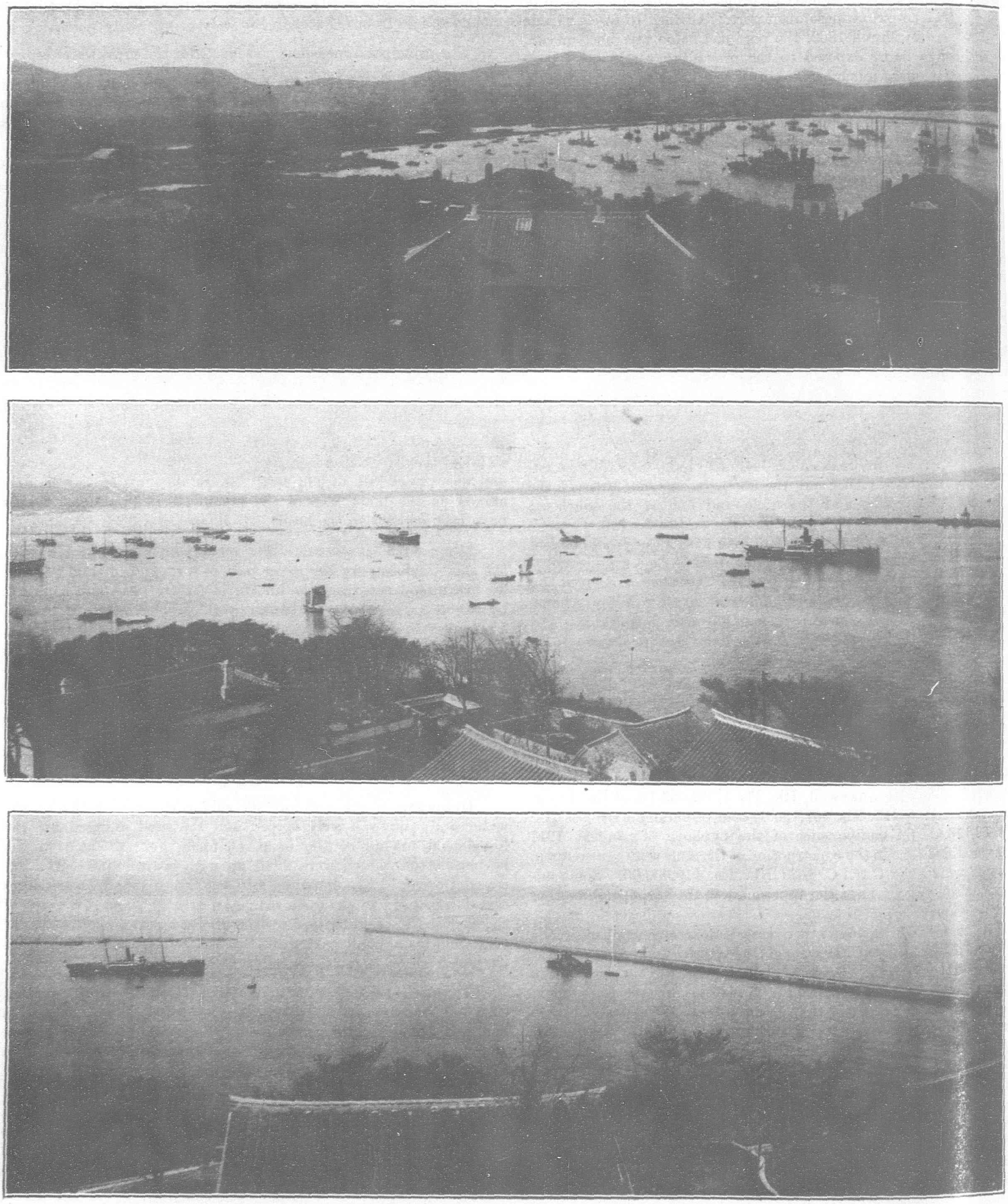
Dredging Work.—Before the rubble mounds of the breakwater and quaywall were tipped and the sand dumped for the foundation mound of the mole, channels were dredged in the harbor bottom which were filled up with coarse sand. The excavated material was delivered into self-discharging hopper barges and dumped out in the open sea. An area of about 100 acres of the shelter has been dredged for the greatest part to 20 feet below C.Z. and for a small part to 25 feet below C.Z. Both approaches to the harbor are being deepened to 20 feet below C.Z.

General.—The contractor employed from 15 to 20 foreign civil engineers, overseers, etc. Besides some Chinese engineers and in the height of the working season from 1,000 to 1,200 Chinese laborers. In the stone quarries about 500 stonebreakers and coolies were generally employed. Fifteen Japanese and Chinese helmet divers were engaged on the work. A suitable site for workyards, living houses, workshops, godowns, sheds, etc., was chosen on the West Beach. At the Bluff depôt, a distance of three to four miles from Chefoo, the stone quarries were situated and also the slipway for the construction of the caissons, houses for overseers, godowns for explosives, etc.

A complete compressed air rock-drilling plant was installed during the construction period in order to increase the output of the quarries. The following plant was used by the contractor :—

One 35-ton overhead traveling steam crane for lifting the lar blocks on to the trolleys ; one 35-ton steam crane on jetty for loadi these blocks on to the lighters ; one overhead traveling cra

PANORAMIC VIEW OF CHEFOO HARBOR WORKS



for lifting 3 tons berm blocks on to the trucks; one derrick crane for loading these blocks on to the lighters; five derrick cranes on the breakwater for handling materials; one bucket dredger; one suction and pumping dredger with pipeline; six hopper barges; Four sea-going steam tugs; one motor-tug; three motorboats; two 35-ton steam floating cranes for setting the breakwater blocks; one steam piledriver and centrifugal pump on an iron pontoon for depositing berm blocks and pumping jobs; five iron lighters for the transportation of blocks; one iron lighter for the transportation of cement; ten wooden lighters; 62 stoneboats and junks; a great number of sampans and rowboats. Moreover, there were all the usual contractor's transportation plant, equipment, spare parts, etc. All the repairwork to the plant and constructing of new gear was done in the contractor's own repair shops.

A total of about 275,000 cubic yards has been dredged to form a channel under the breakwater to receive the rubble mound. In total 153,000 tons of stones have been dumped in the breakwater foundations. In all 4,010 large breakwater blocks have been set, containing 63,500 cubic yards of masonry work. 3,300 three tons berm blocks, containing 5,900 cubic yards of masonry, have been placed on the eastern berm of the breakwater. The superstructure of the breakwater consists of 41,000 cubic yards of masonry work. Before the foundation mounds of the mole and quaywall were dumped 160,000 cubic yards were dredged to form channels in the mud bottom, underneath these constructions, which were filled up with sand. In the under-water work of the mole 1,215,000 cubic yards of sand have been dumped.

A total of 54,400 square yards of brushwood "zinkstuks" with 1½ feet filling and 88,800 square yards with 1 foot filling have been sunk in position. On these "zinkstuks" 66,500 tons of heavy rubble and 20,000 cubic yards of sand have been deposited. The superstructure of the mole contains 392,700 tons of rubble of various grades and the parapet 5,300 cubic yards of masonry work. In all 675 large blocks have been set in the quaywall and wing-walls, containing 9,700 cubic yards of masonry work. The superstructure of the quaywall consists of 3,550 cubic yards masonry work. To deepen the harbor and approaches 650,000 cubic yards of soil were dredged. The whole of the mass of quarried stone 852,000 tons, besides 35,000 tons of broken stone and gravel has been conveyed to the site of the works junk-load by junk-load and deposited according to its size in the various sections of the breakwater, mole and quaywall. In total the dredger excavated 2,300,000 cubic yards of material for the construction of the works. Roughly 106,000 casks of cement have been used. In all 2,000,000 bundles of brushwood were supplied from Ningpo and Antung and used for the construction of "zinkstuks." The dredgers and tugs consumed 24,000 tons of coal during the construction period. In all 21½ tons dynamite and 13½ tons of black powder have been used to produce the quarried stone. The whole of the work on the breakwater was finished on the 13th November, 1920, and that of the mole and quaywall will be completed by the end of this year.

Japan Expanding Candy Industry

AMONG the Western customs adopted by Oriental peoples, most of all by the Japanese, is the toothsome one of candy eating.

Everything from caramles to milk chocolate is consumed in large quantities, and Japanese manufacturers plan to introduce ice-cream and chewing gum made in Japan.

Hanzaburo Matsuzaki, managing director of one of the largest candy-making concerns in Japan, the Morinaga Confectionery, has compiled the following brief history of the industry from the reign of Jin-mu Tenno, the first emperor of Japan:—

"The making of cakes or confectionery had been started in Japan previous to the reign of Jin-mu Tenno, the first emperor. When he celebrated his victorious campaign at Mount Takakura he ordered made some 'mizuame,' a sort of sweet jelly made with millet. The term 'kwashi,' which in English means confectionery or sweetmeat, was coined in the reign of Emperor Suijin. The stuff was made of fruits, but as time went on syrups were introduced, which mixed with rice or wheat flour made a sort of paste cake. The confectionery business developed rapidly in the luxurious mode of life of the Tokugawa Shogunate. Cakes were originally used only as feast offerings to deities, but came to be eaten at formal teas. In the latter days of the Tokugawas white sugar was introduced from Holland, and the Dutch in Nagasaki taught the Japanese how to make sponge cakes and to use sugar for various sorts of cakes.

"All this was done by hand up to 1898, when the Oriental Confectionery Co. was established in Tokyo, aided by foreign experts and imported machinery. There was much popular opposition to these cakes of foreign origin, and those engaged in making them were regarded with hatred and harassed in every possible way, but this feeling has more recently been overcome.

"Confectionery in Japan has come to be regarded as a food. The consumption of sugar amounts to about 600,000,000 pounds per year, of which confectioners use about 360,000,000, or some 60 per cent. This industry has become one of the most important in Japan. Confectionery is consumed by all classes of men, from the paupers to the rich, or offered on the shrines of deities.

"The problem of men and money which has confronted this industry is now being solved. A total capital of Y.27,000,000 is invested in thirty different companies. Another problem is that of drying arrangements, for in Japan the humidity and climatic changes make special machinery necessary, unlike America, where the drying is done by nature. The hardening of chocolate is one of the things we are now working on, with experiments in various kinds of refrigeration."

"Japanese manufacturers pay 5½ and 6 cents for their sugar."

"Our markets are in China, India, Java and the South Sea Islands. My visit to America is to buy machinery for our eight factories in Japan, and I am going to England, France, Germany and other countries for the same purpose, accompanied by three experts from our own plants."

Domestic consumption of confectionery by the 70,000,000 people of Japan amounts to Y.350,000,000 a year, according to Mr. Matsuzaki, and probably will increase to Y.700,000,000, or Y.10 per capita. Much of the candy is used as offerings to local Buddhas and other deities. The Morinaga Confectionery Company makes candies, biscuits, chocolate and cocoa, condensed and dried milks, but Mr. Matsuzaki plans to enter the manufacture of chewing gum and ice-cream, both of which are popular in Japan.

Singapore Municipal Budget

The estimated revenue is $9,710,000 an increase of about $700,000 on this year's revenue, $600,000 of which is from the rates.

The estimated expenditure is $9,723,146, a near enough balancing.

Three loan programs are drawn up. The first assumes that a loan of 12 millions will be raised, the second 5¼ millions, the third no loan. On each of these a plan of works is based. The first plan includes such large works as half a million on roads and bridges, a quarter of a million on roadside drainage, new incinerator unit, Municipal workshop improvement, land garage and driver's quarters at Mackenzie-road, and a million on housing; also $372,000 on new markets; $3,385,000 for electricity, of which three millions is for the tramways and lighting; and five millions on water.

The second scheme, if the five million loan is carried through, still includes the chief waterworks, but not the tramways acquisition, cuts down the extension works in all departments, and brings down the expenditure on loan account to $7,391,750.

The third, or barebones scheme, anticipates no works on loan account.

The estimated expenditure on interest and sinking funds amounts to $1,360,000, roughly speaking one-seventh of the revenue.

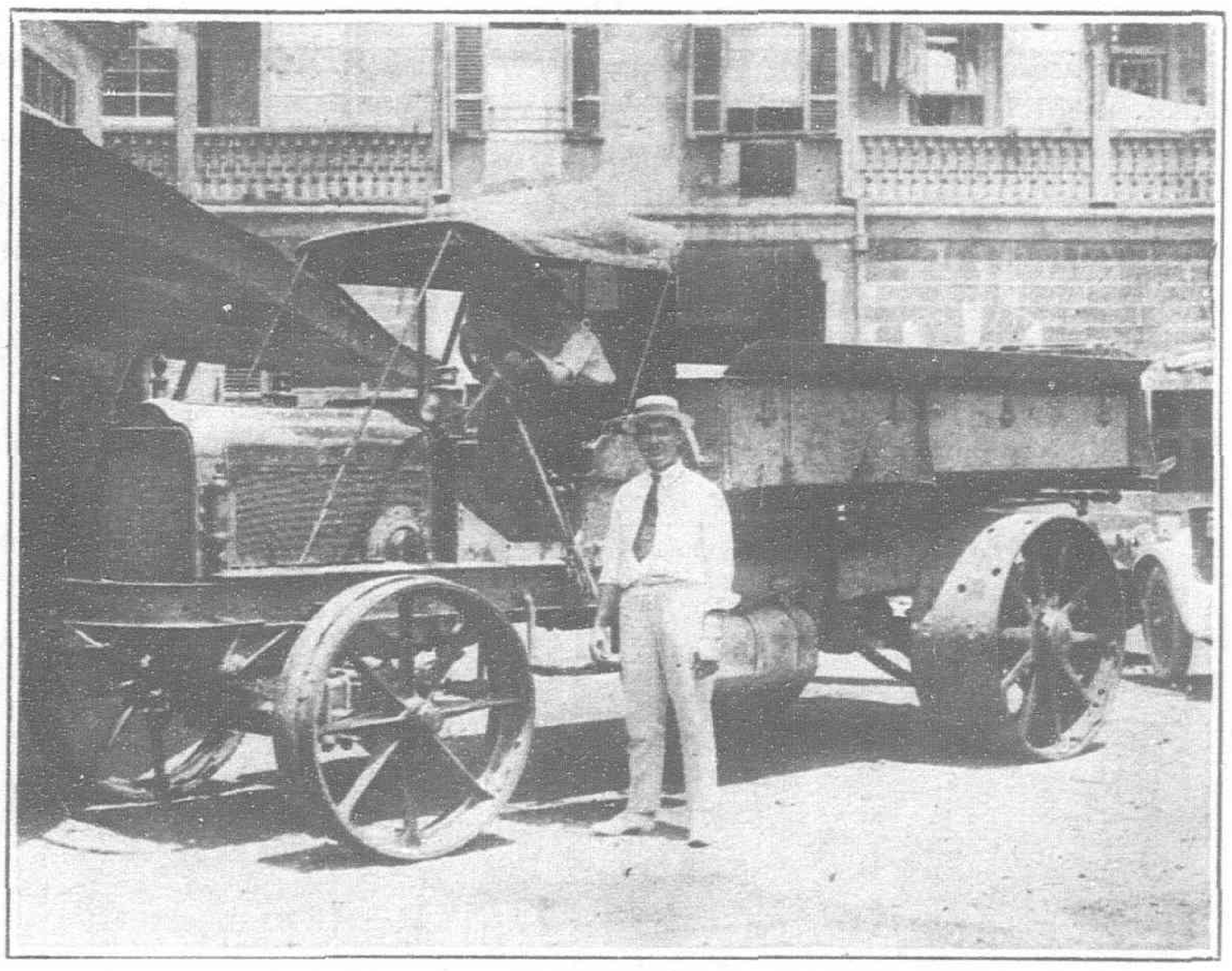
Japan's Motor Industry

By Verne Dyson

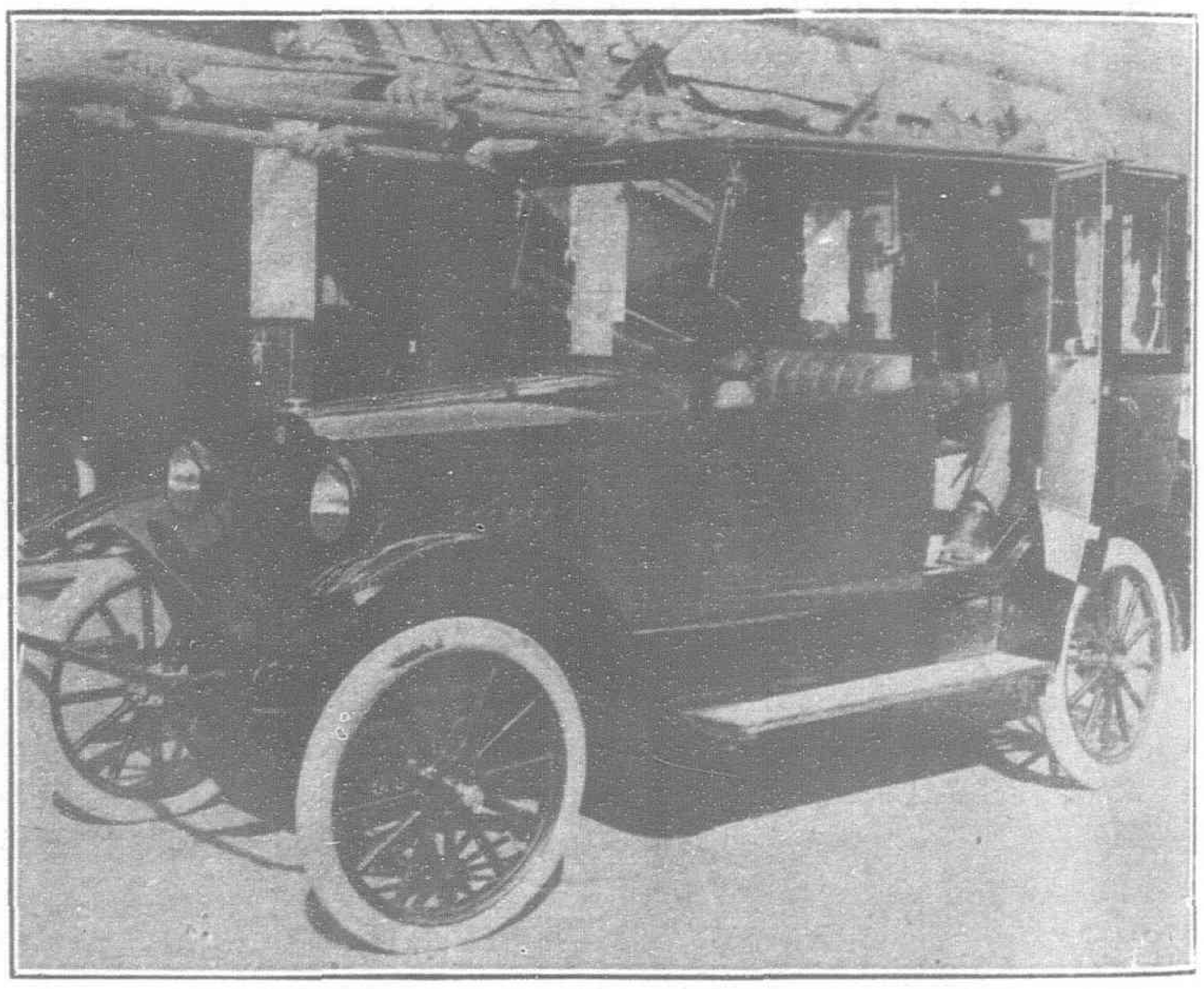
SEVERAL weeks ago in Yokohama I was one of a crowd of several hundred which watched with considerable curiosity the ponderous movement of a huge, mysterious, coffin-shaped box through the streets. The long crate lay across the top of two trucks and there were about fifty coolies in attendance.

The monster carton was a tight fit in the narrow streets which led away from the water-front. When it went into a street it plugged it up tight. Corners were negotiated with supreme effort. Frail Japanese dwellings were in danger of being crushed. The whole performance was marked with solemnity and the deepest concern. I followed the cortege until it came to the back entrance of a garage. The great box held the precious form of a Rolls-Royce.

"You see the Japanese are buying the best there is in motor cars," explained Mr. F. T. Bennett, manager for Sale & Frazar. "This car, of course, is for a very wealthy man ; in fact one of the nobility, but it is characteristic of the Japanese to be satisfied with nothing short of the best of everything when they can afford it.



The Largest Truck in Japan. It is a White Five-ton, Owned by the City of Tokyo



The Favorite Type of Limousine Body which the Japanese Build on the Ford Chassis. There are Twenty of these Cars in Yokohama and 150 in all Japan. The Cost is Y.1,400 more than a Stock Ford Touring Car

After Mr. Bennett had seen the crated car lowered safely to the cement floor, he gave me a personally conducted tour through the plant of one of the two largest motor concerns in the Japanese empire. The other is the Naigai Kogyo Kaisha, Ltd., of Tokyo, of which I will speak presently.

We went first to a stock room. Mr. Bennett explained with a sweeping gesture, "You see eight hundred thousand yens' worth of material in here, and now we will go to another stock room where there is four hundred thousand yens' worth."

In the body-building plant we found about one hundred Ford bodies in the process of making. At present the plant is turning out Ford bodies at the rate of seventy-five to one hundred per day. Sale & Frazar's assembly plant, Mr. Bennett explained, is the oldest institution of its kind in Japan. It was here many years ago that the first motor cars seen in Japan were put together.

Aside from Rolls-Royces ad Fords, the concern distributes the Franklin, Hupmobile, Armstrong Siddeley and the White truck. The company has branches in seven large Japanese centres and in Korea and Taiwan. The plant in Yokohama sells approximately one thousand gallons of petrol daily.

Mr. Bennett is a fat-man American, good-natured and keen and fond of the Japanese. I think his marked success as a salesman comes very largely from his liking for the people with whom he deals. Prejudice to a great extent discounts the efficiency of a salesman, and it would be a splendid policy for foreign firms operating in Japan to transfer or dismiss all representatives who profess hatred for the Japanese. In Japan as everywhere, the element of friendship is a strong factor in successful salesmanship.

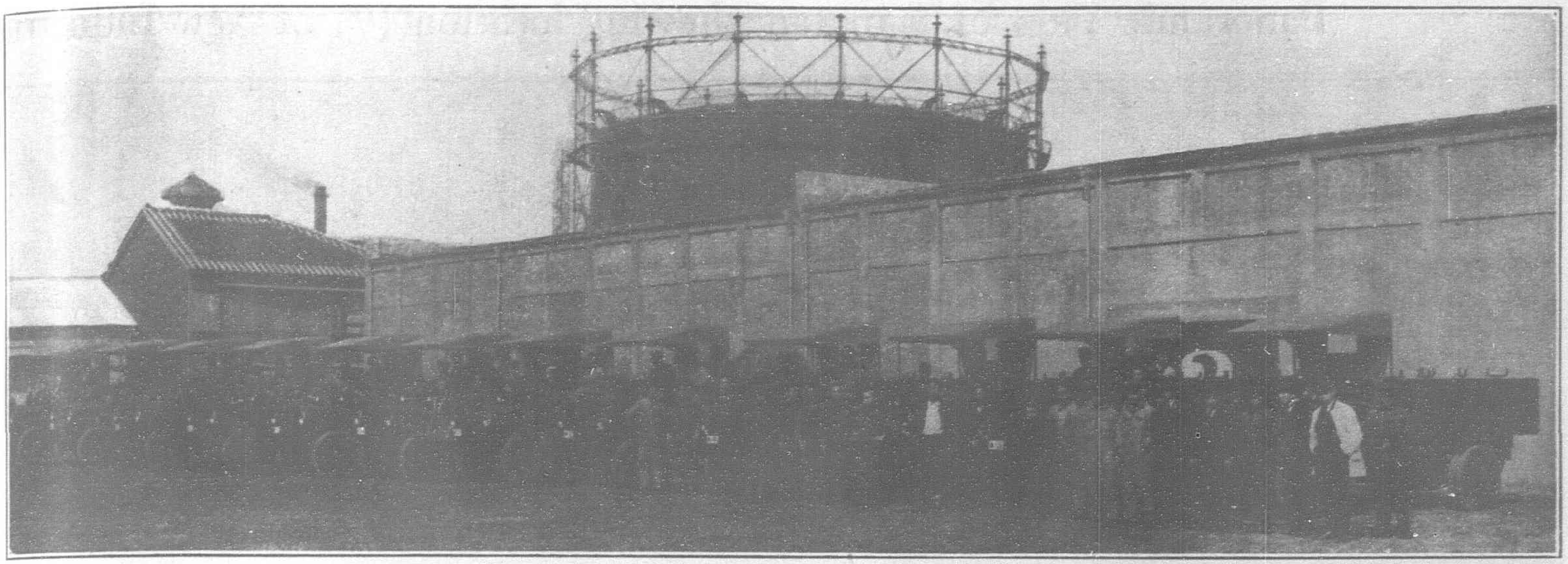
"Frankly, I rather deal with the Japanese than foreigners," declared Mr. Bennett. "I find the natives more appreciative—easier to satisfy in every way. Too often a foreigner who buys a car becomes a nagger."

In reply to some general questions about Japanese motorists, Mr. Bennett said :

"The people in the Japanese cities thoroughly detest motorists. I fancy this condition comes from the fact that there are no sidewalks and that in the past the pedestrian regarded the street—all the street—as his domain. Consequently, in the cities the motor car is regarded as an encroachment.

"In the country, however, the reverse is true. Japanese farmers are friendly to motorists and in case of trouble will give their assistance without charge.

"The motorist in Japan frequently notices that in passing children they will throw up their arms and shout, 'Banzai'. I am informed that in the schools the children are taught to accompany the 'Banzai' with gestures, since this act discourages the inborn tendency of a small boy to reach down and pick up a stone and hurl it at a passing vehicle. The stone-throwing habit is dis-



Twelve Packard Trucks Purchased Recently by the Japanese Army. The Machines are Lined Up in Front of the Godown of the Naigai Kogyo Kaisha, Ltd., in Tokyo

couraged for the reason that some day the emperor might be passing in a motor car."

A visitor to the capital city of Tokyo finds the Packard conspicuous in its various forms of limousine, open touring car, truck, bus and street sprinkler. The Packard is the car of the moment in the official and higher social circles in Japan, due largely, I fancy, to the aggressive methods of the large native distributing firm of Naigai Kogyo Kaisha, Ltd. (International Industrial Company, Ltd.) which has its head office in Tokyo.

When you arrive at the Tokyo central railway station you note a large red Packard motorbus in waiting. It is one of two which are used by the Mitsukoshi Company, Japan's largest department store, in transporting customers between the station and the emporium.

The Mitsukoshi bus is mounted on a one and one-half ton truck chassis. The wooden body has a red lacquer finish with the trade-mark of the firm painted on either side. The two bodies were made in the large modern body-building plant of the Naigai Kogyo Kaisha, Ltd.

Packard twin-six limousines or touring cars are owned by these prominent people in Japan: Baron H. Mitsui, head of the great world-wide Mitsui business organization; Mr. T. Nakahashi, minister of education, and for many years president of the Osaka Shosen Kaisha, one of the three largest Jagnese steamship companies; Mr. S. Wakao, member of the house of representatives and a well-known business man and politician; Mr. H. Gurney, councillor to the British embassy; and by the Tokyo office of the Yokohama Specie Bank.

There are approximately one thousand motor trucks in Japan and of this number about 16 per cent. are Packards. The Japanese army and navy own sixty Packard trucks. The aviation corps of the army recently purchased twelve trucks in one lot.

"Among Packard owners in Japan, the Japanese army stands first," Mr. G. Satow, foreign manager for the Naigai Kogyo Kaisha, Ltd., informed me last week in Tokyo, "and, of course, what the army uses principally is trucks, but there is an increasing demand for Packard commercial vehicles in various industries and different lines of business.

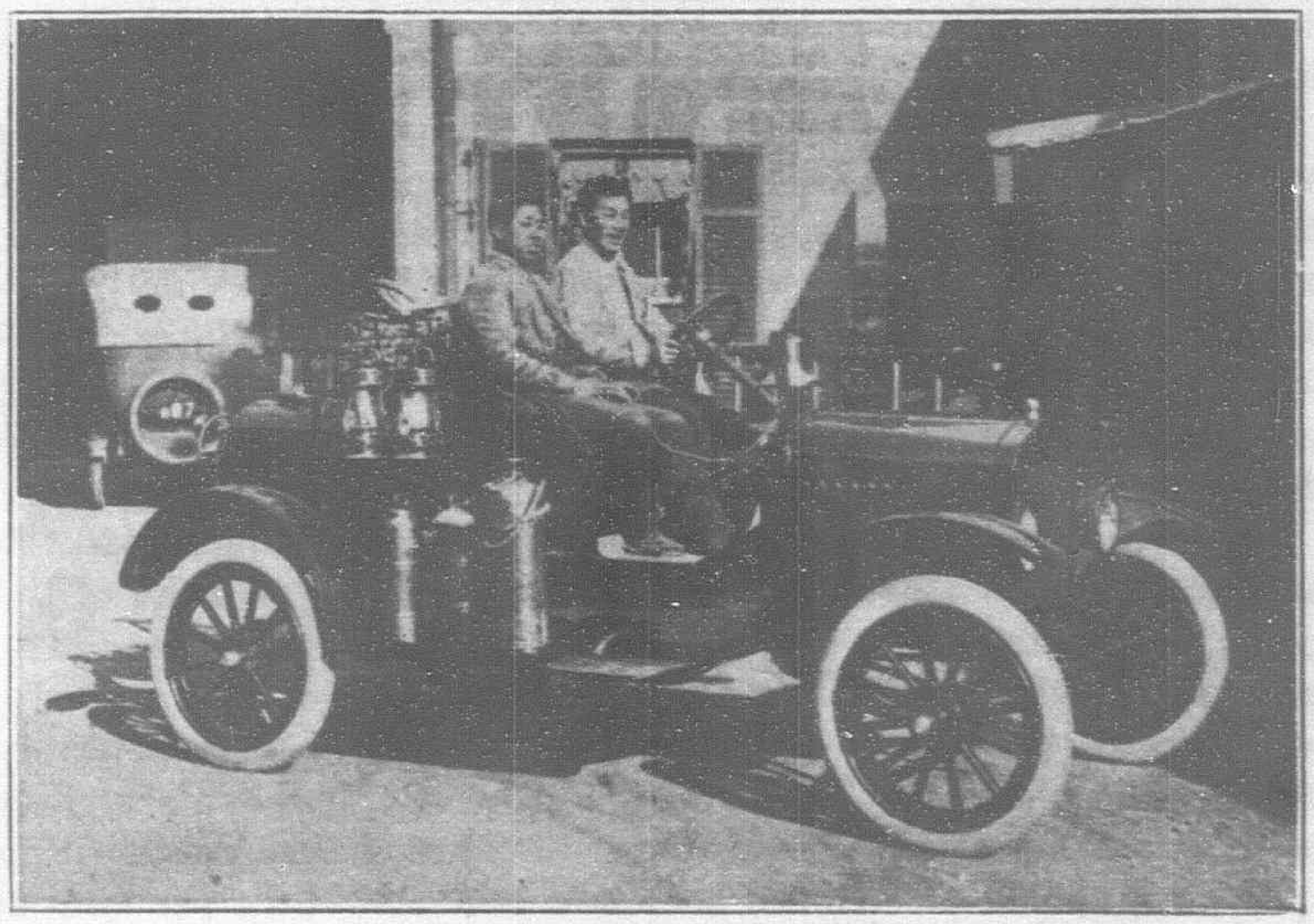
"At present the principal feature of a motor truck that impresses a business man is its high price. Not enough consideration is given to the other features of safety, saving of time, ultimate saving and general efficiency. The tendency is to hold on to old methods of transportation even when they are shown to be the most costly.

"Another enemy of the truck in Japan is bad roads which considerably shortens the life of a motor car. Modern business methods, however, call for up-to-date transportation facilities, and good roads must be provided.

"Most of the trucks operating in Japan are from one to two and one-half tons capacity; there are very few heavier trucks. As a matter of fact, the operation of heavy trucks is prohibited by police law because of the weak bridges and other bad road conditions. Roads are being improved and these obstacles gradually removed. Only the army is permitted to possess heavy trucks.

"Packard sprinklers, purchased by the municipal government of Tokyo, were the first machines of this type to operate in Japan. Because of the bad condition of the streets in Tokyo, sprinkling is most important. Formerly the wide streets of the capital were sprinkled by small man-pulled carts. One can easily imagine the cost and inconvenience of this method.

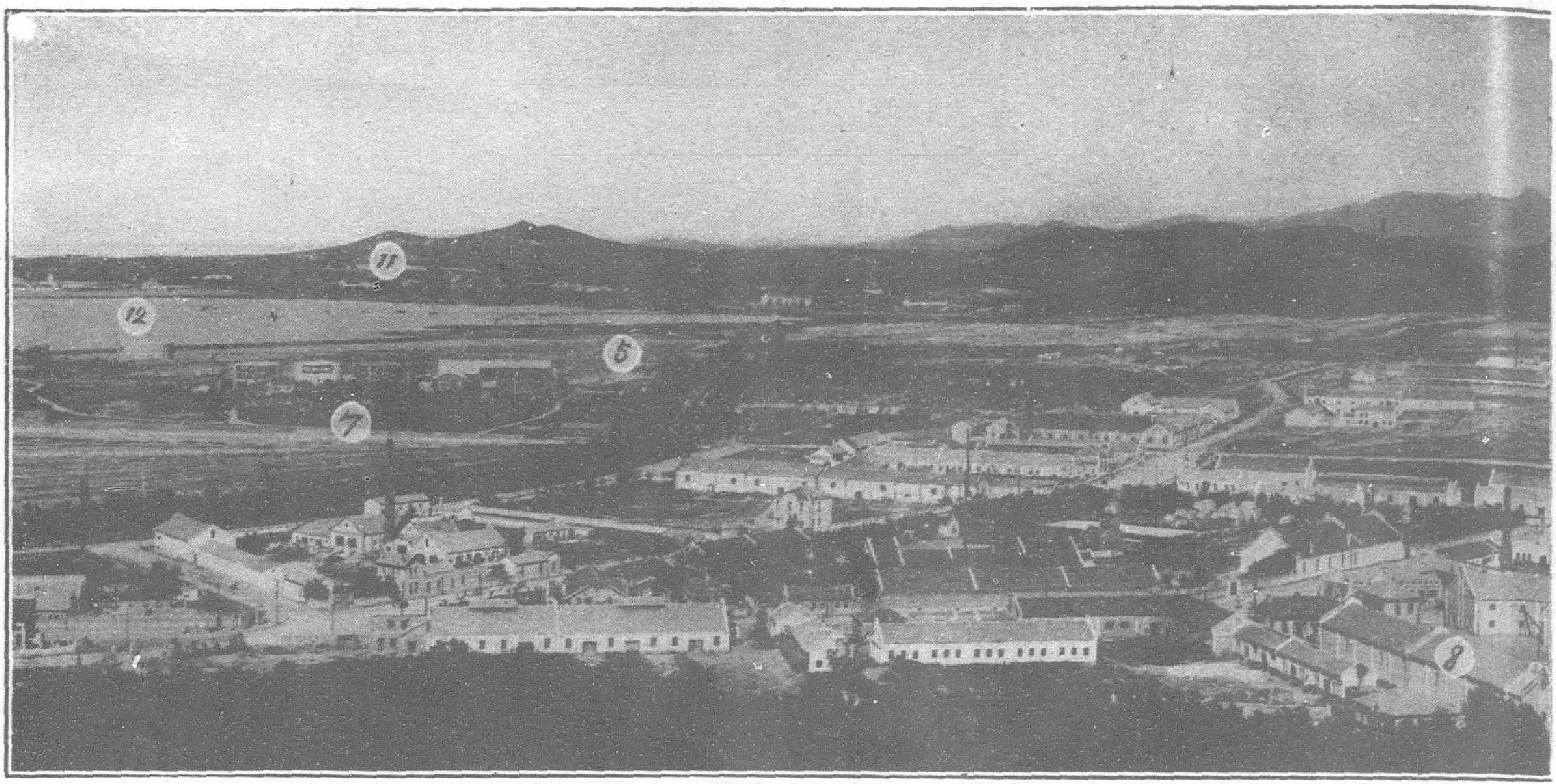
"When the officials of the city decided to employ motor truck sprinklers in 1919, His Majesty, the emperor, was so pleased with the idea that he contributed Tls. 50,000 toward the cost. At present there are a number of Packard and other truck sprinklers in Tokyo. Following the example of this city, Yokohama purchased two Packard street sprinklers last year. As in other kinds of service, the Packard sprinklers are giving most satisfactory service both in Tokyo and Yokohama.



The Private Fire Department at the Sale & Frazer Motor Car Plant in Yokohama

"Two Packard dumping trucks are owned by the electric bureau of the municipality of Tokyo, which controls both the tram car service and the electric lighting system. They are used in the transportation of sand and gravel. The prefectural government of Tokyo also has purchased several Packard dumping trucks."

Panoramic View of Tsingtao, showing location (9) of New Industria



(7) Tank Installation of the Asiatic Petroleum Company. (5) Reclaimed Area. (11) The Town of Syfang, location of the Shantung Railway Shops. (12) Future Reclamation Project. (8) Factory District

A 60-Ton Self-Propelling Floating Crane

DURING May last, a 60-ton self-propelling floating crane was delivered by the Werf Gusto, Firma A. F. Smulders, of Schiedam, Holland, to the Manchester Ship Canal Company. The crane is of the firm's "Gusto" slowing and derricking type, and is provided with two blocks, one capable of working with loads up to 60 tons, and the other up to 10 tons, both arranged so that the crane can deposit heavy loads on its own pontoon. The loads are counterbalanced by two traveling ballast weights, the effect of which can be varied by traversing them horizontally, so that by their means the pontoon which carries the crane will remain practically level athwartships while lifting all loads up to 60 tons.

The crane rests on a tower built in the pontoon. The former is secured to the sides as well as to the bottom of the latter. This tower is of conical shape, and is provided with a bearing at the top. The main parts of the crane consist of the revolving framework and the jib. The framework is composed of an upper platform, which rests on the top bearing, a lower platform, on which the centre rollers of the tower and traveling counterweights are fitted, and the connecting structure between the two platforms.

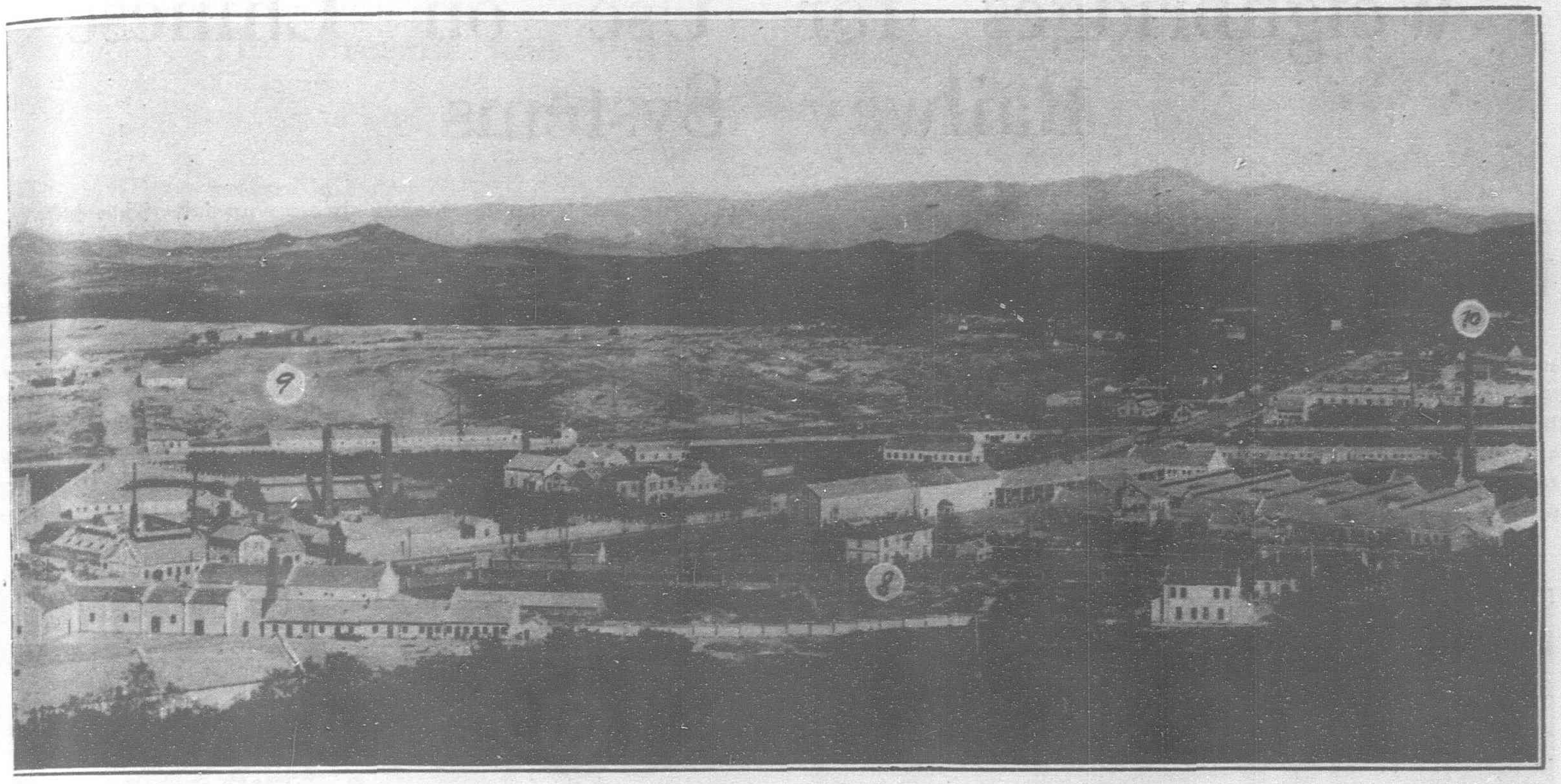
The maximum height of the hooks, both for the main and the auxiliary hoist, is 65-ft. from water level at lowest position of the jib. The hoisting ranges are 75-ft. and 120-ft. respectively. The maximum radii of the hooks are 60-ft. and 76-ft. respectively, which correspond with a distance of 32½-ft. and 47½-ft. respectively clear of the pontoon. The jib can be lowered so that its highest point is not more than 73-ft. above the water line. The hoisting speeds for the 60- and 10-ton loads are 7-ft. and 40-ft. per minute respectively. A complete revolution with the full load of 60 tons was made at the trials in about 2 min.

The cabin in which the machinery for effecting the various movements of the crane is placed is situated on the lower platform. At the back of it and between the upper and lower platforms are two vertical screw spindles for raising and lowering the jib. A counterweight moved with these shafts between vertical guides serves partly to balance the weight of the jib. The latter is connected to the framework by means of two horizontal pins at the front of the upper platform and to the movable counterweight on the vertical screw spindles by two tie-bars. By means of these tie-bars the jib can be derricked from its lowest position to its highest position.

All the movements of the crane are effected by electric motors, of which there are seven in all. The power is transmitted from the motors by worm and spur gearing with machine-cut teeth. Electrical brakes are fitted to all the motor shafts. The various movements are controlled from a cabin placed on the top of the crane framework. The driver, having a clear view not only of the load, but also of the deck of the pontoon, is able to observe the movements of weight he is dealing with. In front of him are the controllers with which he can control any of the motors as required. All the controlling apparatus is arranged close together so that the driver can make any required movement without altering his position. In the cabin are also placed the necessary switches, measuring instruments and resistances for the electrical equipment, the apparatus for controlling the inclination of the vessel, and an indicator on which the position of the jib can be seen at any moment as well as the distance of the hooks from the centre of tower. There are telephones between the controlling and machinery cabins, and speaking tubes between the former and the deck and machinery cabin. There is a special emergency switch for use in the event of it being necessary to stop any operation instantaneously.

The builders explain that only one man is required in the control cabin for working the crane, this simplicity of handling being made possible by connecting up the electrical installation in accordance with the Ward Leonard system. For the system, as applied in the present instance, it is claimed that (*a*) any load can be hoisted or lowered at extremely low speeds, which is of the utmost importance when handling heavy weights, erecting, etc. ; (*b*) that any weight can be moved at varying speeds without any change being made in the mechanical transmission ; (*c*) only weak currents are controlled, so that wear and tear of contacts is reduced to a minimum, and there is practically no loss of energy ;

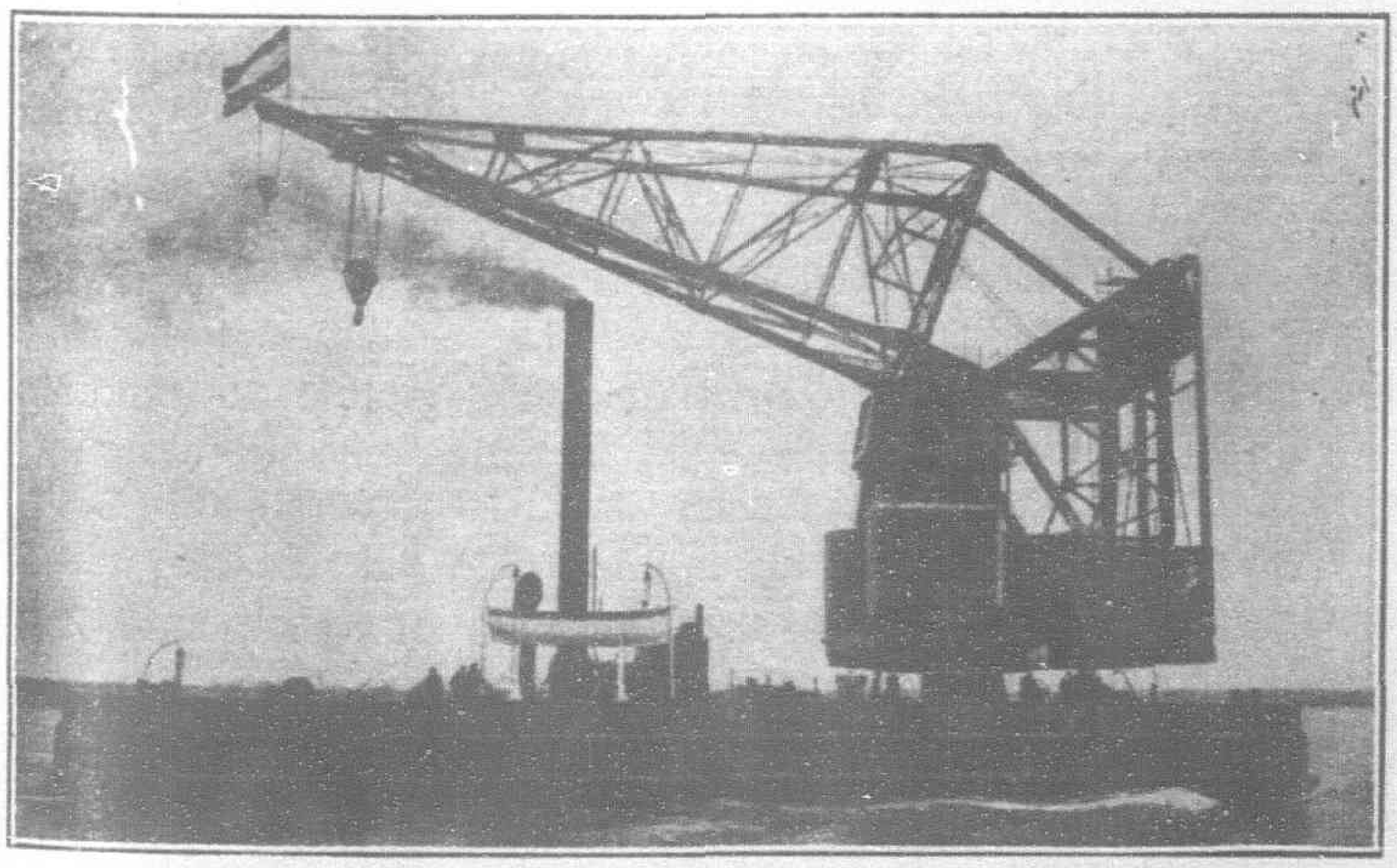
Town, now being laid with Streets, Sewers and Waterpipes



(8) Factory District. (9) Area for New Factories. (10) The Chinese City of Taitungchen

(*d*) the starting of the motors is accomplished without placing any undue stresses on the crane structure or the transmission gear; and (*e*) owing to the small number of controllers, switches, etc., maintenance charges are low. Wherever possible, safety devices, such as switches for limiting the working range of each movement, have been fitted. Emergency switches, electrical brakes and an automatic cut-out for guarding against too heavy currents, are also provided.

The current for actuating the motors is supplied by dynamos which, together with their switchboard, are placed in the pontoon. These dynamos are driven by one of the compound propelling engines. The cables conveying the current pass from the dynamos to the interior of the crane tower, and are connected to the slip rings on the outside of the upper end of the tower. From these slip rings the current is collected by brushes and distributed to the various motors in the machines and to the control cabins. An extensive electric light installation is provided for the pontoon and the crane. By means of a clutch the engine previously mentioned can be coupled to the propeller shaft. The machinery for propulsion consists of two sets of vertical compound engines with an independent surface condensing plant. At the trial trip on the river Meuse an average speed of 5½ knots per hour was attained. Between the two engine-rooms is placed the boiler which is designed for a working pressure of 150-lb. per square inch. The deck machinery includes two windlasses, hand steering gear, bollards, engine-room telegraph gear, etc.



60-Ton Floating Crane for the Manchester Ship Canal, Built by Werf Gusto, Firma A. F. Smulders, Schiedam

The deck aft in the path of the radius of action of the crane is free of all obstacles and is especially strengthened so that any heavy weight may be placed on it. Cabins for the officers and crew, gallon, lamp room, lavatories, also coal bunkers, water tanks, store rooms, etc., are built on deck or in the pontoon. Only three men are required for operating the crane, viz, engine driver, deck hand and crane driver.

Tsingtao's New Industrial Town

Notwithstanding the difficulties surrounding the transfer of Tsingtau to the Chinese government, as long as it remains under control of the Japanese, they apparently intend to carry out the improvements already planned, and to this end recently started work on the new industrial section of the port located close to the harbor and railway.

The work, which was let to the lowest bidder at public tender, calls for:

1. Surfacing, 158,000 *tsubo* (including surfacing of roads)
2. New roads; 72 feet wide and 2,180 feet in length
3. New roads; 48 feet wide and 18,894 feet in length
4. Drain pipes; 39,304 feet in length
5. Water pipes; 10,404 feet in length.

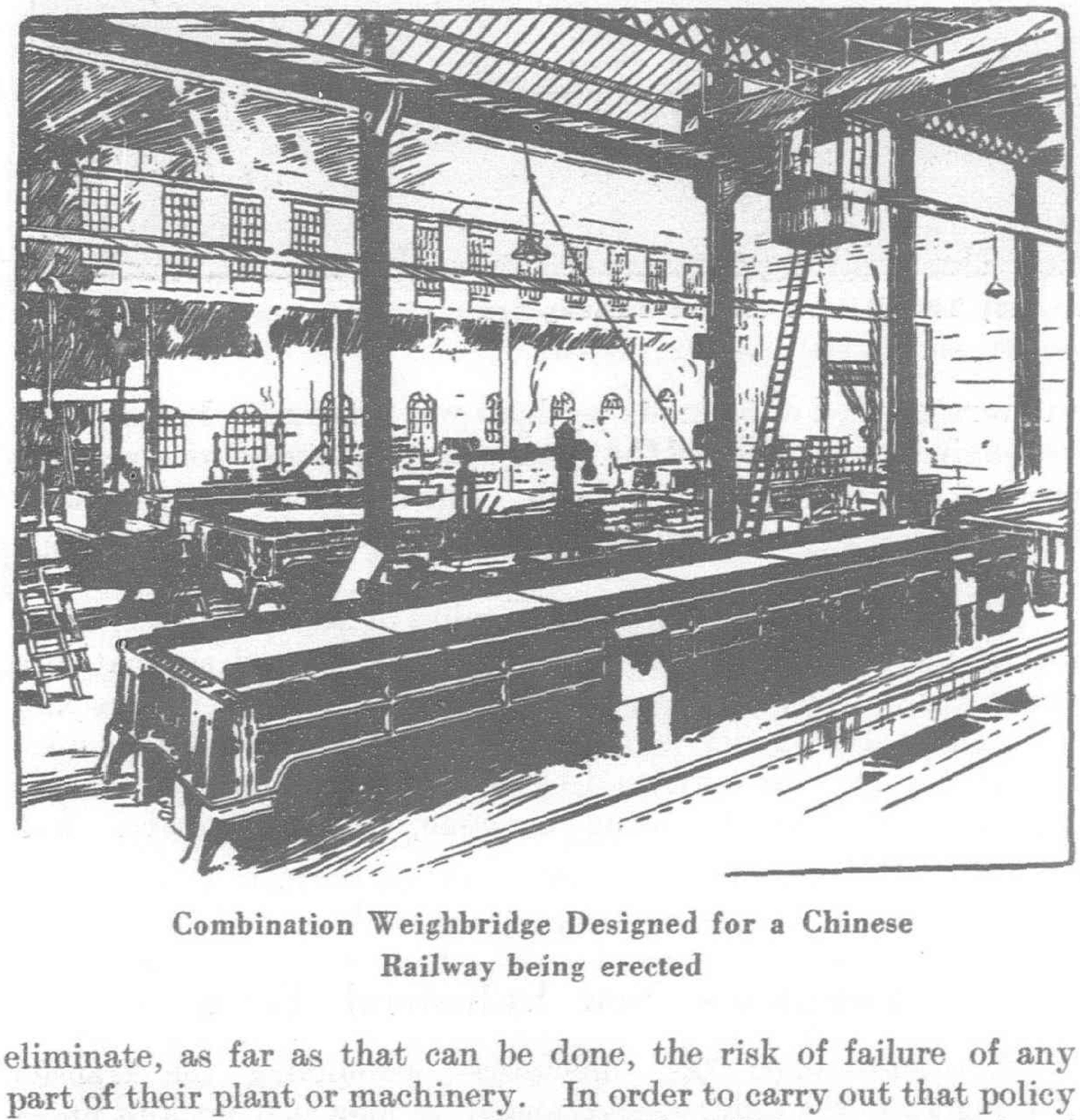
The contract was obtained at a bid of Y.146,000 on the part of the To-Kwo Company (Tung Hwa Kung Ssu), a Japanese-Italian combination, organized by Mr. T. Kaidsuka and Major Garibaldi, the latter acting as managing director. Work was commenced on July 11th last, and is expected to be completed in September 1922. The present contract, when completed, will open up a new business and industrial section located in close proximity to the transportation centres, and the authorities are apparently sparing no reasonable expense to make this district a fitting complement to the residential section created by the Germans.

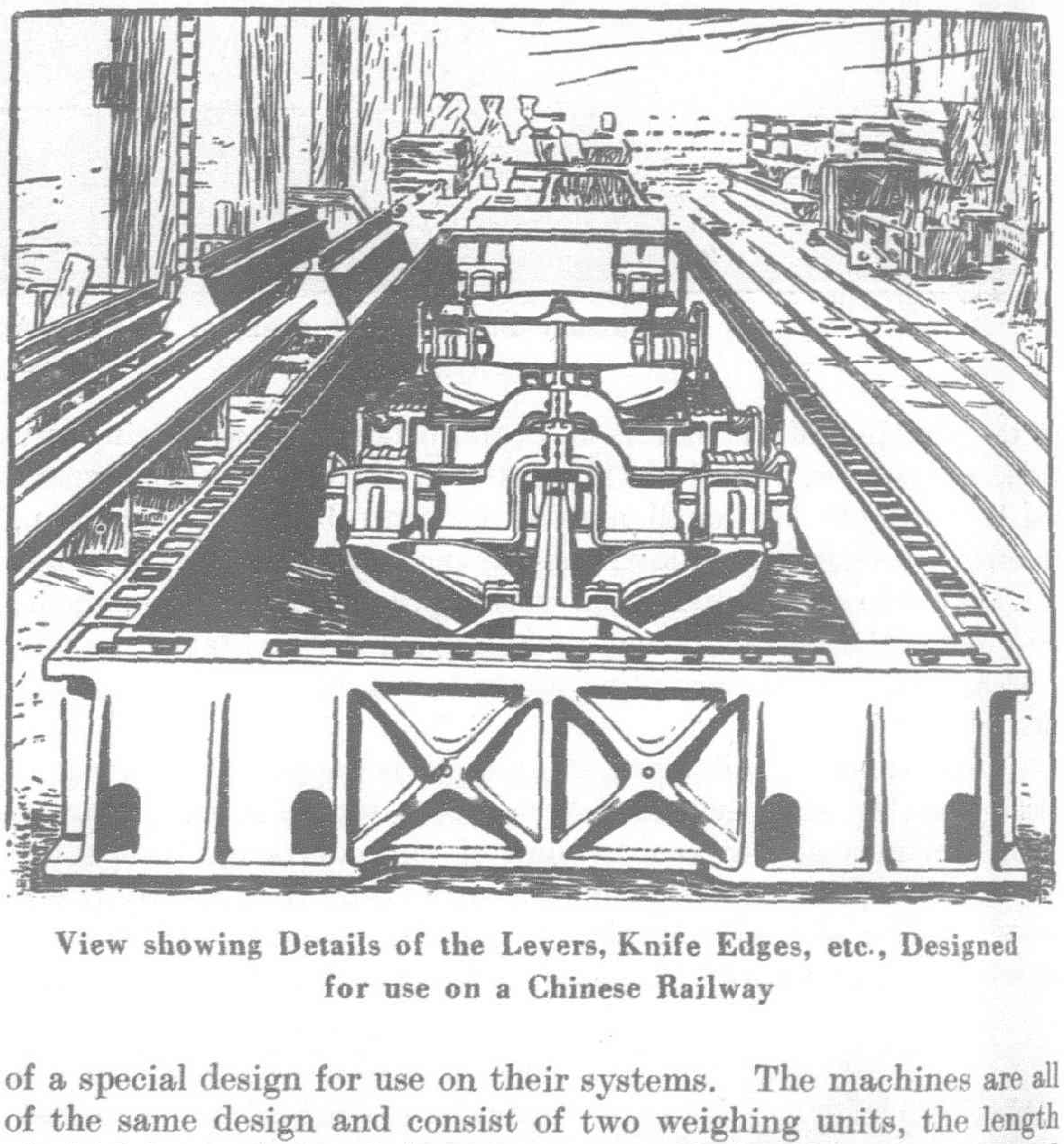
Weighbridges for Use on Chinese Railway Systems

GREAT strides are being made by the engineers who are responsible for the maintenance and efficiency of the important railway systems of China, and they appear to be making every effort to bring the systems quite up-to-date by the introduction of the most modern plant and appliances. At the same time great care and discrimination are employed with the object of introducing only those machines and appliances, which, by actual test, and owing to the reputation of the manufacturers responsible for their production, are certain to be efficient, and to give good results in service. The policy of the engineers is no doubt to eliminate, as far as that can be done, the risk of failure of any part of their plant or machinery. In order to carry out that policy the engineers must have confidence in the efficiency, not only of those engineering products which are perfected under their own supervision, and which are manufactured in accordance with their own designs, but also of the machinery of a special nature which is manufactured for them to designs put forward by the makers, and "backed" by the reputation of those makers, and the experience and knowledge of their own engineers who are specialists in the particular class of machine which they manufacture.

A very good example which bears out this supposition of ours is to be found in the large railway weighbridge of to-day. Messrs. Henry Pooley & Son, Ltd., of Birmingham, England, have a world-wide name as the manufacturers of weighbridges which embody every possible improvement, and which can be regarded always as the product of highly skilled and experienced weighing machine engineers for the use of equally skilled and experienced railway engineers.

The machines produced by that well-known house can be relied upon always to give satisfaction whatever the conditions of service, as they are in every case designed to efficiently meet the special and varying conditions of the different countries, climates, etc., with which engineers must always contend. They have had a unique experience of railway conditions during the eighty-five odd years during which they have manufactured weighing machines for all the chief railway companies of Great Britain and many overseas countries; and their engineers have not failed to take full advantage of the vast experience gained during that time. These facts, and also the striking fact that nine-tenths of the railway traffic of Great Britain and Ireland is weighed on Pooley weighing machines no doubt influenced the engineers of a number of the railway companies in China, with the result that Messrs. Henry Pooley & Son, Ltd. are now shipping out a number of weighbridges of a special design for use on their systems. The machines are all of the same design and consist of two weighing units, the length of which is so calculated that every wagon of a freight train composed of mixed wagons varying from the small fixed frame wagon of 12 tons capacity, with a wheelbase of 9 feet, to a large 40-ton bogie wagon with a wheelbase of 35 feet, can be weighed as it passes over the weighbridge, without the necessity of uncoupling. An enormous saving of time is thereby effected. The machines are designed to withstand the passage of a locomotive imposing a load of 60 tons on a wheelbase of 12 feet, and as all the parts are of ample strength to withstand that rolling load, no relieving apparatus of any description is required.


Combination Weighbridge Designed for a Chinese Railway being erected


View showing Details of the Levers, Knife Edges, etc., Designed for use on a Chinese Railway

The indicating steelyard is graduated up to the metric equivalent of 70 tons, and in this connection it will be noted with interest that the Chinese railway companies are now using the metric system of weight only—the machines being arranged to indicate by divisions of 5 kilos, up to 70,000 kilog.

The two photographs which accompany this short article represent one of the machines during construction at Messrs. Pooley's Works at Kidsgrove, in North Staffs., England, and the arrangement of the weighing levers, the ample strength of the parts, and length of the knife-edge centres, can be clearly seen.

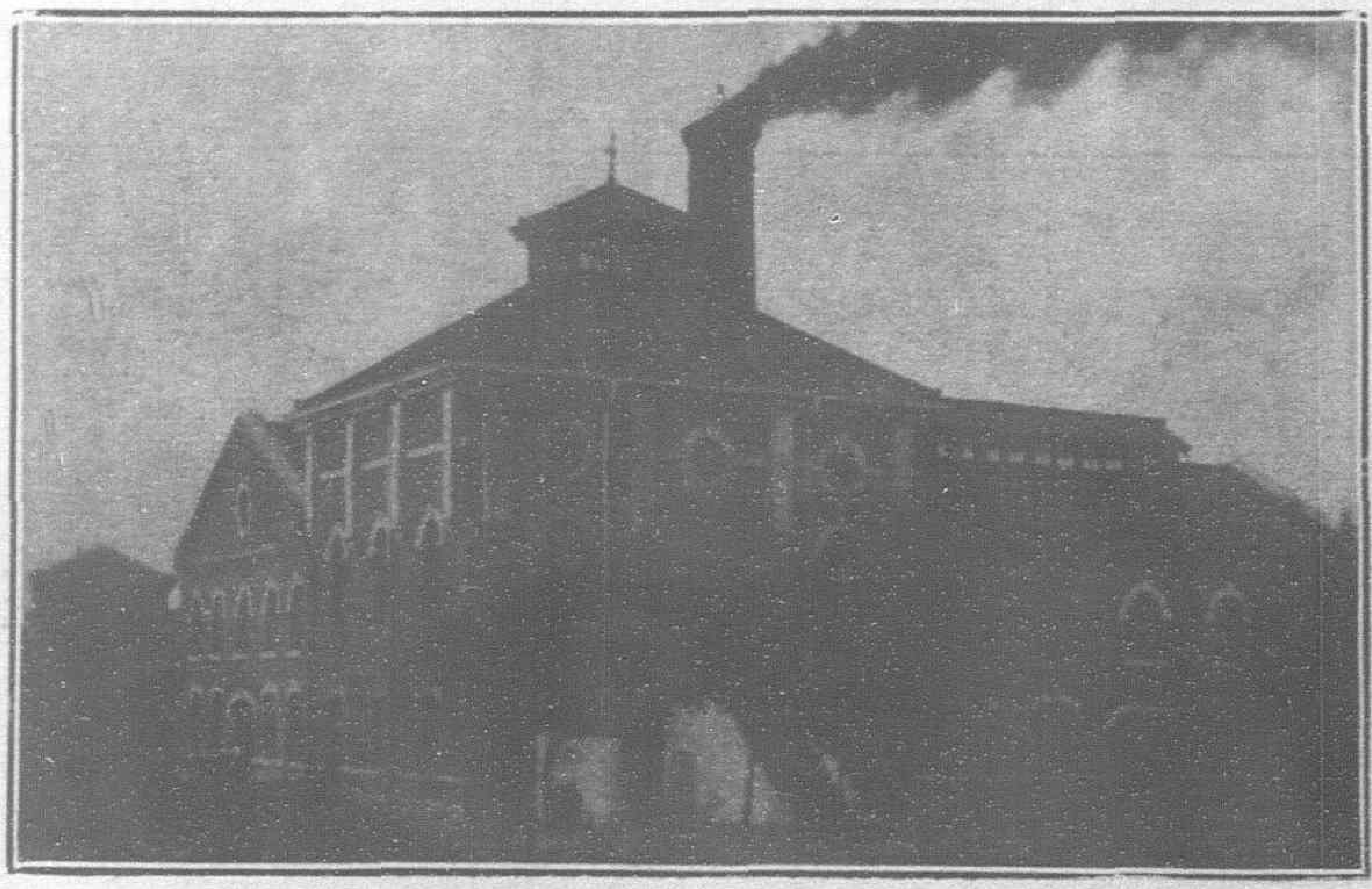
The Dairen Waterworks

The Present and Future of a Model Establishment

BY DR. Y. KURATSUKA

Continued from October

THE temperature in Dairen district varies from about 30° C. (the highest in summer) to 15° below zero C. (the lowest in winter), the range between both extremes being 45° C. Therefore, it is probable that even a massive structure as the dam will expand or contract and will cause temperature cracks, and this phenomenon will be more remarkable than in the mild climate as in Japan.



View of Main Pumping Station at Shahokou

Such temperature cracks are only natural phenomena and arequite impossible to be avoided.

However, in a district such as about Dairen, which has excessive heat and cold, it was deemed necessary to make some suitable provision. Therefore, the contraction joints are provided, the first undertaking in Japanese masonry dams. Such joints number five in the principal part of the dam besides two more in the overflow portion, totaling seven. The distance between any two successive joints is about 90-ft. By means of these joints, the body of the dam is absolutely divided vertically. The contact surfaces of each joint have a thin coat of asphalt, laid thereon, so as to prevent adhesion, thereby giving no resistance to expansion and contraction. Then, a couple of copper strips are kept inserted across the contact surfaces of each joint along the longitudinal axis of the dam, or at a certain angle thereto, to cut off the leakage of water through the joints.

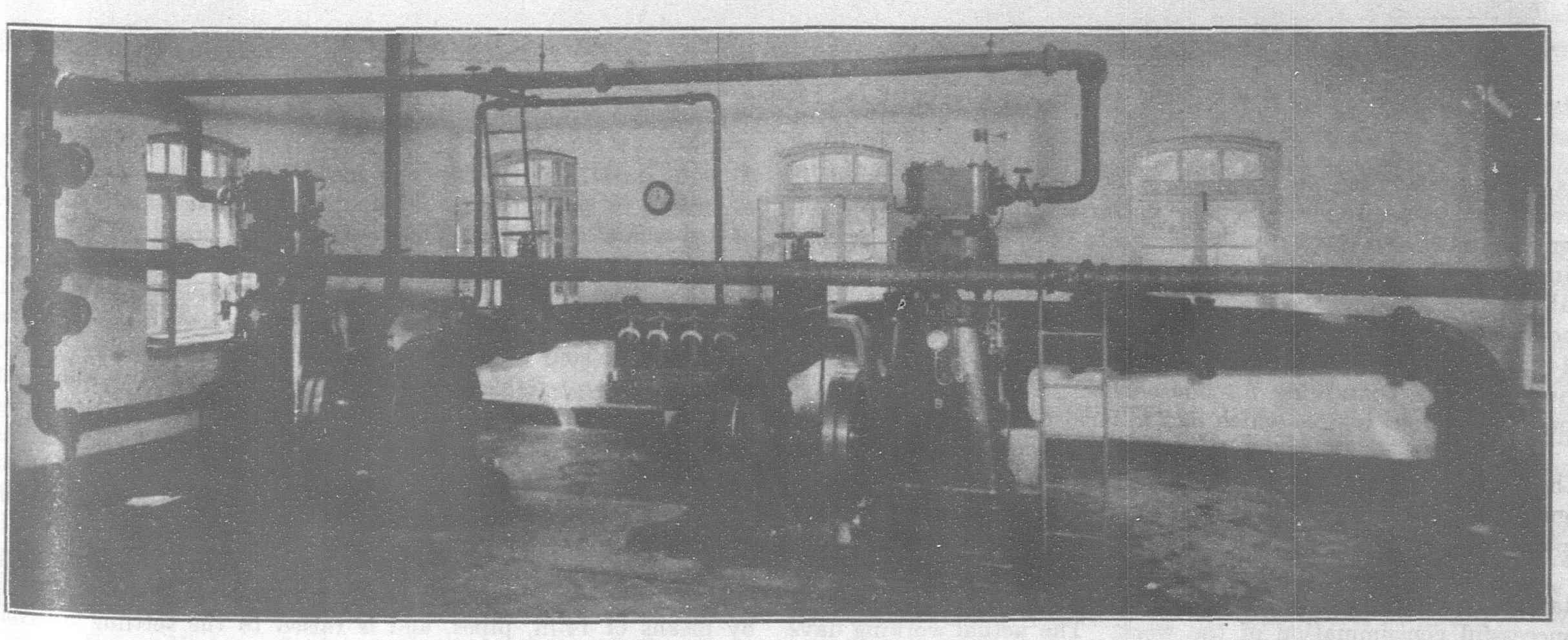
The passageway on the top of the dam is 8.7-ft. wide, hemmed with a line of breastwall made in concrete, 3-ft. high, on either side. At each edge of the passageway runs a drain, 4-in. wide and 2½-in. deep. The bottom of the intake tower stands on the same level as that of the reservoir itself. It is 14-ft. from the bottom to the rocky foundation. The tower is semi-circular in shape, with a radius of 7-ft., and its inside face is vertical. On the outside it gently tapers upward at the rate of about 38/1000. The wall is 6-ft. thick at the bottom and 3-ft. thick at the top.

The outside is made of granite, 1½-ft. or 1-ft. thick, 1⅕-ft. high, and with varying widths; whilst the inside is built of stone, 1½-ft. or 1-ft. thick and 1⅕-ft. square with the use of 1.2 mortar, the space between both facing stones being filled up carefully with concrete made of 0.8 cement, 0.15 pozzuolana, 0.05 lime, 2.5 sand, and 4.5 gravels. On the top of the tower, a valve operating chamber is made of brick with a floor made in reinforced concrete, half a foot thick.

Four head stocks for opening and closing the valve are installed. The drain pipe projects out of the intake tower, and is surrounded with a wall, 10-ft. and 8-ft. long on the sides and 6-ft. high from the bottom of the reservoir, so that the accumulation of mud at the bottom may not fill up the drain pipe.

The overflow made at the left bank end of the body of the dam is faced with granite cut stone. The front overflow weir (constructed specially) is made of rubble concrete with rubble facing, having a contraction joint at the interval of 60-ft.

The overflow channel for the overflow weir is from 32.7-ft. to 58.5-ft. wide, with the bottom thereof slanting at 1/100. The foundation concrete is 1½-ft. thick, with a stone facing 6 inches in thickness. From the point, at which the overflow water from the side overflow weir adjoining the body of the dam joins the water from the front overflow weir, the overflow channel takes the width



Intake Centrifugal Pumps in the Main Station of 156-ft. to 94.5-ft. With regard to the longitudinal slope, it is $\frac{1}{30}$ in the middle and $\frac{1}{55}$ on either side. It is also made of foundation concrete, 1½-ft. thick with as tone facing, 6 inches in thickness.

Transversally it inclines from either bank towards the middle at the mean gradient of $\frac{1}{50}$, so as to gather the flow to the middle. It terminates at the exposed cliff on the river bank which is 48-ft. high above the river bed.

The stability of the dam was computed with the specific gravity of 2.25 or 140.4-lbs. per cubic of masonry. The greatest stress on the toe of the dam is 6.04 tons per square foot, and the vertical stress on the heel is 5:5 tons, both being within the safe limit of the bearing power of the foundation.

The principal auxiliary works to the reservoir include, first of all, the construction of a new road along the bank of the reservoir. The dale forming the reservoir is situated on the so-called middle road between Dairen and Ryojun (Port Arthur). A new road had to be constructed along the hillside on the left bank, starting from a point about 400 yards below the dam. This road is 4,400 yards long, and contains a bridge, 90-ft. long, built in reinforced concrete, besides four culverts. In order to prevent gravels, sand and earth from flowing into the reservoir, two weirs in the main stream and four in the branch streams were built above and outside the reservoir. The land area purchased in connection with the construction of the reservoir comprised 140,146 *tsubo*. The Chinese houses caused to be removed numbered 25 containing 52 households. There were 53 grave mounds and one temple which had to be also removed.

Moreover, at about 120-ft. below the dam, a meter house to the leading main pipe was built, furnished with a simplex Venturi meter so as to measure the quantity of water sent to the filter plant at Shahokou.

From April 5th, 1914, on which the preliminaries were taken in hand three years and seven months intervened till the successful consummation of the work. The actual working days numbered 1,190. The total outlay amounted to Y 477,501.

Conducting Pipe

The pipe line running from the reservoir to the filtration plant at Shahokou is 12,000 yards in length and is made of iron pipes, 20 inches in diameter. The water is sent by gravitation and the maximum daily capacity is 18,000 tons, being 7½ cubic feet per second.

B. Water Source at Shahokou

The water source at Shahokou was, as already stated, executed according to the initial program. Out of the eight wells sunk by the Russians in the Malan River, each 20-ft. in diameter and 20-ft. in depth, four were found in a serviceable condition with more or less improvement. Below these wells, a blind dam was constructed across the river bed in order to intercept the underground flow and to raise the level of the ground water which is collected into the wells.

The river bed in these neighborhoods consists of a layer of gravels, from 20-ft. to 30-ft. in depth, and the underground flow filtering down, was no less than 220,000 cubic feet (or 6,100 tons), according to the Russian record. It was intended to make most of the above available. This water source, from the experience had during the water famine in 1917, may be considered to give a safe natural flow of 4,000 tons per day. Moreover, by the completion of the Wanghiatien reservoir, half the drainage area of this water source has been lost, and 2,000 tons a day may be put down as a reliable supply from this source. The blind dam is 1,680-ft. long, and reaches down to the rocky foundation at the depth of from 8-ft. to 30-ft. made of clay and concrete. On the top it is 3-ft. in width, and it broadens as it goes lower into the ground with a series of steps. On the upstream side of the weir, a conduit, 4-ft. wide and 6-ft. high, was provided. Each well is connected with 6-in. iron pipes, and the underground flow accumulating in the wells and conduit is sent down to the suction well by means of 14-in. pipes, and is raised to the settling reservoir by the intake centrifugal pumps.

350 H.P. Motor Driven Turibine Pump for Forcing Water to the Service Reservoir at Fushimidai

C. Lanchiatun Water Source

This water source created hurriedly during the winter from 1916 to 1917 is situated at Lanchiatun in the village of Hsiaopingtao at 7½ miles west of the city of Dairen. It has a drainage area of 5.4 square miles. With an estimated water supply of about 600 tons, but its extension at some future date is in contemplation, so as to make it auxiliary to the Malan River water source. At this source, three wells lined with stone were excavated to gather the underground flow of the drainage area. Two of the three wells are connected each with a mortar pipe, 1-ft. in diameter, with the third well. Again, in the dale of Lanchiatun, about 1,720 yards above, a minor dam was constructed, and in the middle of this dam, an intake well, of 4-ft. in diameter, was sunk to gather both surface and underground flows, the water so gathered being conducted into the third well by means of 10-inch iron pipes. A pumping house was built at the eastern side of the third well, and by a Washington pump and also a centrifugal pump, the water passes through 10-inch forcing main pipes, 8,000 yards in length, into a concrete tank installed at the highest point of the line, and then it is sent down by gravitation to the settling reservoir at Shahokou.

The appurtenances comprise the following :—

1. Dam.—63-ft. long; maximum height 23½-ft. wide, 6-ft. on top and 50 ft. at bottom; made of clay puddle, the upper part having a stone facing.

2. Collecting Wells.—First well; 31.1-ft. deep, 30-ft. in diameter, lined with stone wall and covered with a lid. Second well; 14.3-ft. deep, 30-ft. in diameter lined with stone wall and covered with a lid. Third well; 38.4-ft. deep, 30-ft. in diameter, lined with stone wall and covered with a lid.

3. Pumping Station.—Wooden flat building with basement built of stone. Machinery installed: In lower floor of basement: 1 Washington pump (of 35 horse-power). In upper floor of basement: 16-inch centrifugal pump equipped with semi-Diesel engine (of 25 horse-power). In surface chamber: 15-inch turbine pump (of Inokuchi system). Total head, 165-ft. capacity, 50 cubic feet per minute. 2 vertical steam engines (of 40 horse-power).

4. Tank: 30-ft. square in inside measure, 12-ft. in depth, made of concrete, covered with a lid, and having a capacity for 300 tons of water.

D. Equipments at Shahokou Filter Plant

1. Filtering Installation.—There are two filtering installations. One is the slow sand filter plant; the other is the rapid filter plant. As the water is likely to get frozen in winter, the slow sand filter beds are built in the ground, and the cover is made in reinforced concrete, and on the top is laid a layer of earth at least 2-ft. deep. There are two filter beds, each 180-ft. long and 90-ft. wide. The filtering speed of each bed is 8-ft. a day, and the total filtering capacity is about 7,000 tons a day.

2. Rapid Filter Plant.—The rapid filtration process has been adopted for the second extension program. All equipments, apparatus and appurtenances were furnished by the Pittsburg Filter Manufacturing Co., of the United States, imported through the Toyo Shokai, No. 1 I-chome Yurakucho, Kojimachi-ku, Tokyo.

A detailed description of this plant will be given in a future issue of this publication.

C. Aeration and Settling Appliances

By this equipment, the raw water is brought into contact with the air either in sprays or in a thin layer. This process is repeated at nine places on varying scales.

For an ordinary filter bed, an ordinary settling reservoir is wanted; and for a rapid filter bed, a chemical settling reservoir is required.

The Dairen Waterworks has both kinds of filter beds.

D. Clean Water Reservoir

The clean water reservoir is constructed under ground, 60-ft. square and with a depth of water of 8½-ft. It is divided into two compartments by a partition in the middle. In each compartment, the water route is constructed, so that it may flow through between two walls running crosswise, and when it reaches the edge of the chamber, it turns a little the other way and then takes a parallel line to the first, and so on. In this manner, the water keeps running in an almost zigzag manner.

E. Pumping Station

The pumping station is equipped with two kinds of pumps classified by their different purposes—one is the intake pumps and the other the forcing pumps.

(1) Intake Pumps.—The underground flow is gathered by the Shahokou wells (inclusive of the blind dam), and it is then pumped up to the settling reservoir by means of the intake pumps which are as follows:

Two centrifugal pumps, each 10-inch in suction diameter (head, 45-ft.: capacity, 1,800 English gallons per minute).

Two Cornish steam engines.

(2) Forcing Pumps.—By means of the forcing pumps, the filtered water in the clean water reservoir is sent to the service reservoir, Fushimidai.

Two triple-expansion vertical plunger pumps (head, 250-ft.: capacity, 1,800 English gallons per minute).

Two water tube boilers (Babock & Wilcox).

One three-stage electric-driven turbine pump (head, 320-ft. capacity, 2,500 English gallons per minute; actual horse-power, 350).

Of the above-mentioned three, the two first mentioned were installed on the first extension program, and the third was installed according to the second extension program. The trial operations of the turbine pump was completed at the end of March 1921.

Out of the three transmitting pumps, two are in constant use, the other being held as the spare one.

Their maximum daily transmitting capacity is 25,000 tons, which is more than sufficient for the existing capacity of the water sources.

Water Transmitting Pipes.—There are two water transmitting pipe lines, each 16 inches in diameter, running the whole length of 4,200 yards from the pumping station at Shahokou, to the service reservoir, Fushimidai.

Service Reservoirs.—There are three service reservoirs at Fushimidai, two of which are for distribution of water to the lower levels at Dairen, and the third to the higher levels.

Service Reservoirs for Lower Levels.—They are located at 190-ft. above the mean tide. One is of circular shape, and was installed under Russian regimé, capable of holding 80,000 cubic feet of water. The other is of square shape, with a capacity for 144,000 cubic feet.

They are both underground and constructed in reinforced concrete. The total capacity is 224,000 cubic feet, which represents half day's supply capacity of the Dairen Waterworks.

Service Reservoir for Higher Levels.—With the rapid growth of the city of Dairen in recent years, the strips of land at the foot of Nanzan Hill running from east to west in the south of the city have been converted into residential lots. Even, prior to this, the higher levels of the city have been shown to have too small a water head, giving only an unsatisfactory supply.

Therefore, for the second extension program, a service reservoir for the higher levels was constructed at the height of 290-ft. above the mean tide. Water may be sent up to this reservoir from the other reservoirs for the lower levels by means of two 8-inch turbine pumps, each capable of transmitting 108 cubic feet per minute and lifting the water by 130-ft., and having 40 actual horse-power. The water thus obtained is distributed by a 10-inch service pipe to the higher levels at the base of Nanzan Hill and Osakamachi.

This reservoir is 60-ft. square with a depth of water of 12.6-ft. and a capacity for 1,200 tons.

SERVICE PIPES.—The service pipes range in diameter from 4 inches to 18 inches. The supply district includes Jijiko (east end), Tanchiatun (south of Hsiaokangtzu, Chinese quarter), Shahokou and Hoshigaura, in addition to the city of Dairen.

CONSTRUCTION EXPENSES.—Since the Dairen Waterworks passed into Japanese management, up to March 31st, 1921, the aggregate cost invested amounted to about Y.4,784,000 comprising the following :—

For 1st extension program	Y.994,000
For 2nd extension program	
Construction of impounding reservoir	Y.477,501
Laying of conducting pipes	335,808
Rapid filtering installation	161,179
Reconstruction of settling reservoir	84,526
Construction of clean water reservoir	25,776
Purchase of water transmitting pump, removal of pumps already installed and extension of pumping station	112,017
Installation for supply to higher levels	190,505
Laying of additional service pipes	257,569
Connections installed in purification plant	72,133
Purchase of machinery and tools, house building and office furnishing	101,986
Lanchiatun Waterworks installation	180,000
Laying of additional water mains	271,590
Laying of additional service pipes in city	519,410
Total	4,784,000

Chapter IV. Third Extension Program

The work on the second extension program was finished on March 31st, 1921, thereby quite completing the program. The third extension program was submitted to the extraordinary session of the imperial diet in 1920, and work was taken in hand in August of the same year, a brief outline of which is given under : The site for the new water source has been fixed upon Lungwangtang under jurisdiction of the Ryojun (Port Arthur) civil administration at about 18 miles west of Dairen. The Malan River valley has already been availed of to its utmost, leaving no further room for extension on a large scale. The need of some suitable spot being pressing, the Lungwangtang valley adjacent to the Malan River valley has been selected after a careful inspection of the district. The river consists of three branches, the longest running for almost nine miles. In geological structure, the Lungwangtang valley bears a close resemblance to the other. The river has little water running in ordinary times, but at a heavy rain, there will be a freshet just as in the other case. By constructing a reservoir at Kuanfangtzu at about 2½ miles from the mouth of the river, where it gets the narrowest, a large catchment area and a great storage of water may be made available. On this account, an extensive reservoir is to be constructed at this point, to dam up the river water during the rainy season. A pumping station will be built below the dam, and the water is to be sent to Dairen over the hills intervening.

The new dam is to be made of rubble concrete, being 121-ft. high and about 1,048-ft. in total length, of which 352-ft. is for the overflow and 180-ft. is for the earth dam. The new dam is to be 14-ft. in width on top and 92-ft. at bottom, with its body containing about 13,300 cubic *tsubo* of masonry The catchment area for the new dam comprises about 15 square miles; the new reservoir to be so formed is to have the water area of 480,000 *tsubo*, 75-ft. in maximum depth of water, and the effective storing capacity of 16,000,000 tons. Compared with the Wangchiatien reservoir it will be nearly two and half times as large in the water area and three times as much in storage capacity. As regards the dam the new one will be 25-ft. higher and over twice as large in actual volume of masonry.

For pumping power, the electric power house at Ryojun (Port Arthur) is to be enlarged, and transmitting wires are to be laid over the distance of about ten miles. Three turbine pumps each of about 500 kilowatts, are to be installed.

The main transmitting pipes are from 24 inches to 22 inches in diameter.

At the time when the appropriation for the third extension program was asked, all materials were excepcionally high priced as a result of the great world war, and on this account, out of the consideration of economy, it was planned to lay transmission pipe lines, of 20 inches in diameter, with the length of 7,000 yards from the new pumping station to a point at 2,280 yards above the Wangchiatien reservoir through a tunnel, 3,200 yards in length, to be pierced through the watershed rising between the Malan River and Lungwangtang valleys. The water was thus to be discharged into the Wangchiatien reservoir by natural inclination, to be led by means of the existing conducting pipes into the purification plant at Shahokou.

However, as the materials, labor, etc., have gone down since, and especially as the daily local consumption has sharply increased quite beyond the original expectations, the question of supplanting the above plan with another, by which the water may be conducted more advantageously from the new Lungwangtang Pumping Station direct to Shahokou by the shortest cut viâ Huangnichuan, is under consideration.

When the new extension program is completed, the supply capacity of the Dairen Waterworks will consist of 22,000 tons from both Wangchiatien and Lungwangtang, 2,000 tons from the Shahokou wells, and 600 tons from Lanchiatun, giving the total of 24,600 tons, which is about twice as much as the present capacity.

The same work was started in 1920 and is to continue to 1924, the total cost reaching Y.4,681,380 which sum is apportioned according to the years as follows :

Fiscal year 1920	Y. 433,500
,, 1921	1,192,495
,, 1922	1,243,895
,, 1923	1,103,495
,, 1924	707,995

Hongkong Reclamation Scheme

Work in connection with the Praya East reclamation scheme was begun on November 1st. The contract was awarded to Messrs. Sang Lee & Co. whose tender was $2,766,899.70.

The contract period runs for six years but the job may be finished before then. The contractors have established their offices in the building which used to house the Corinthian Yacht Club and a commencement has been made with the erection of officers, workshops and workmen's houses.

The first thing will be the laying of intercepting drains for taking away the discharge of sewers and stormwaters which at present discharge through the Praya Wall, and to construct open drains. Temporary transport lines will have to be laid down for the hand waggons which will be used pending the arrival of locomotives which are expected to be available early next year.

In order to dredge out the trench for the sea wall a contract has been awarded to the Anglo-Chinese Engineering Association, Ltd. who are co-operating with Messrs. Bailey & Co. for the supply of a Priestman self-propelling steam grab dredger mounted on a new steel barge. The dredger has to be delivered by April 13 next and until then it will probably be found possible to employ at intervals the dredger at present in the service of the government.

The Far Eastern Review

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and advancement of Trade in Far Eastern Countries

ENGINEERING FINANCE COMMERCE

5 JINKEE ROAD, SHANGHAI CHINA

Telegraphic Address: Farview, Shanghai

SHANGHAI, NOVEMBER, 1921.

Japan's Militarism

NO series of articles about Japan has caused such widespread regret amongst Japanese as those recently written for the *New York Herald* by Mr. Louis Seibold. Mr. Seibold is unquestionably the foremost political writer in the United States. His knowledge of New York state and national politics and his intimate relations with the great men of the nation have made his name known to every serious student of American affairs. For twenty years he was the star writer for *The New York World*, and while connected with that journal, his views on the Far East, vague as they were, coincided with its general policy on these questions. No one in American journalism would question for a moment Mr. Seibold's integrity, independence of thought and ability through years of training, to analyze correctly a political situation, yet in his conclusions about Japan he has utterly failed to live up to his past high reputation.

It would be useless to attempt at this time to refute or correct the many mistakes in Mr. Seibold's arguments, especially those dealing with Japan's militarism. Mr. Seibold stayed only a month in Japan during last summer, and it is difficult to believe that even a journalist of his calibre, analyzing a new and complicated problem, could reach exact conclusions in that short length of time.

The Japanese militarists have had their day. They saved the empire from extinction in 1905, and, if they had gone to sleep at the switch any time previous to the break-up of Russia in 1917, their sacrifices would have been in vain; Japan would have ceased to exist as an independent nation. Much new light has been shed in these problems by the publication of Count Witte's memoirs and the disclosures of state papers in other countries. No fair-minded writer with a knowledge of these facts can honestly condemn the Japanese militarists for keeping the nation keyed up to the highest state of preparedness.

Japan's militarists are no exception to their prototypes in other parts of the world. They have a specific duty to perform, in which sentiment has no part. They have made mistakes. They have been, at times, unnecessarily severe, but even in this, have not departed from precedents set by every other army in the world occupying alien territory.

We entertain no illusions about Japan's militarists. Any other body of he-men placed in the same position would have done exactly the same, and any other body of he-men would have made the same mistakes. If the critics of Japan's militarism could look behind the screen that concealed to the rest of the world the moves of Russia up to the date of her fall, their sympathy would go out to the heroic defenders of Japan and appreciation take the place of condemnation. They were up against a proposition before which the position of France and England *vis-à-vis* Germany, was child's play. Aside from England, they had no real friends, and it is only natural that time after time they imposed their will upon the government.

The military party in Japan frankly admits its blunders, but they say in effect, we have been pushed hard and placed in a desperate position. "If, at times, we have over-stepped the rules of the game learned from the West, the Western powers who closed their doors to us and then followed us into Asia in an attempt to hamper and circumscribe our expansion and measures for self-defense, while our back was against the wall, cannot be held altogether blameless." The leaders of a nation of 70,000,000 constantly menaced on one side by a foe outnumbering it four to one, and on the other by the constantly growing animosity of another rich and powerful people; forced to watch the slow and steady strangulation of their national life, cannot fairly be held to strict accountability for all they might do in sheer desperation to defend themselves.

It is the failure to recognize this fact that gives rise to misconceptions about Japanese militarism. If Count Witte is accepted as a reliable witness: if it is true that Russia was preparing to resume the conflict in 1912; if it is true that Russia and China were partners in a secret alliance aimed against Japan, then the world should stop this incessant nagging of a people whose one "crime" is a determination to fight like men for the preservation of their national independence. Until other facts are adduced that will disprove those revealed at the peace conference and in Witte's book, it is useless to continue to condemn the Japanese for qualities which all other nations are proud to possess. When foreign criticism of Japan's general staff is directed against its interference with the foreign relations of their government, the rest of the world will find all liberal Japan in full agreement. The only justification advanced by the militarists for such interference lies in the fact that their duty to the empire can never be altogether concluded. They dare not sleep while Russia remains an unknown quantity. To have relaxed their vigilance in Eastern Siberia at any time within the past two years, would have invited the flooding of Manchuria and China by the hordes of Lenin. Yes, the Japanese militarists have made mistakes. They will continue to blunder, but after all is said and done, they are very human, very little different from great figures of ancient and modern history the western world is proud to honor.

* * *

Taikoo's Generous Gift

ENGINEERS in China will appreciate the generous contribution to the Hongkong University for the endowment of a Taikoo chair of engineering and the engineering section of the university from the firm of John Swire & Sons. This is not the first time that this firm has manifested its interest in the university, for in 1909, the three firms of John Swire & Sons, the Taikoo Sugar Refining Company, Ltd., and the Ocean Steamship Company, jointly contributed the splendid sum of £40,000 in proportions of £30,000, £5,000 and £5,000 respectively towards the endowment fund of the university.

In commenting on this gift, the *South China Morning Post* says:

"Hongkong is fortunate in possessing such generous and public spirited firms and whilst they continue there should be no fear of the university's good work suffering from lack of support. With regard to the specific object of this most recent gift no subject is more worthy of support in Hongkong than engineering.

"The shipbuilding industry has developed wonderfully within the last few years and promises to expand still more rapidly in the future when the trade slump disappears. Engineering plays an important part in shipbuilding and it will be a great advantage to the colony to find her future engineers on the spot instead of seeking for them elsewhere."

The publicity given to more magnificent endowments for the cause of education in China, tends to overshadow other equally meritorious contributions, of which Taikoo's has a most far-reaching bearing on practical training and the development of engineering in this part of the world.

A New Era in the Philippines

Governor-General Wood's Inaugural Speech

"I appreciate, more than I can tell you, this cordial welcome and the spirit which prompted it. I feel highly honored by the confidence of the president in appointing me to this most important post, and deeply touched by the cordial expressions of approval of his action by Filipinos and Americans.

"It is my purpose, so far as lies in my power, so to conduct the government that it will be characterized by economy, efficiency and true progress ; a government of the people by their representatives to the extent provided in the Jones Bill ; a government characterized by honesty, morality and an appreciation of the fact that public office is a public trust ; that fitness is an absolute requirement for appointment to office. There must be no turning back, but steady progress on sound lines.

Governor-General Wood

"The Philippines people have made wonderful progress in the last twenty-three years. I doubt if any people, under the friendly guidance of another, have made a greater advance in the same period of time. This has not been accomplished by the Filipinos alone, but with the absolutely unselfish aid of the United States, acting through thousands of loyal, unselfish Americans who have worked with an eye single to the best interests of the people of these islands.

"Although Oriental in blood and birth, the people of the Philippine Islands are closely allied in religion, in ideas of government, in methods of administration and in law, to the great Christian nations of the West and especially with America as to form of government, civic and religious liberty and liberal institutions. As a people, you were born and educated as Christians. There must be no sliding backward in the Christian faith. In this connection it is well to remember that the first sign of the decadence of a people is a disregard of religion. That a people be well grounded in their faith is essential to real stability and progress.

"Your enthusiasm and thirst for education and your accomplishments in building up a sound system of public education is beyond praise. We must keep it up. Indeed, we must extend and improve it. Education must be free to all. Your women must be given equal opportunity with your men. Nothing I have seen in the islands has impressed me more than the character, loyalty, thrift and all-around good influence of the women of the Philippines.

"The government must encourage, not discourage, private enterprise. As a general policy, I believe that the government should keep out of business. The Judiciary must be independent and stable and kept absolutely outside the scope of political influence and out of politics, for an independent, fearless judiciary is the foundation of stable government.

"We must push forward our public works, especially roads and irrigation. We must give far more attention to public health and sanitation. Too many precious lives are lost each year that could be saved, and easily saved. Almost one-third of all the children born in the Philippine Islands die in the first year of their lives, a frightful indictment of our sanitary and health conditions.

"We must provide the remedies for the cure of our lepers, for a large proportion of them can be cured. We must take better care of our insane and defectives.

"We must do all we can to build up a fuller appreciation of the dignity of labor ; of the obligations of citizenship ; to increase our agriculture and push forward the development of our natural resources, and so organize and conduct the government that funds adequate to the needs of progress and development will be available. We must live within our income. Above all, we must work together to a common end—the welfare and happiness of the people of the Philippine Islands. We must hold on to sound principles and policies. This is no time for rash experiments. We must keep our feet on the ground and remember that our road lies ahead of us, not behind.

"My purpose is to do the best I can to reestablish the credit of the islands ; to build up their commerce, increase the prosperity of the people and make the government a model of efficiency. This I cannot do without your co-operation and support, all of you, Filipinos and Americans and others living in the islands. With your co-operation the work will be easy, for the spirit of the people is excellent and the natural resources enormous.

"We must do all we can to build up an instructed public opinion, for without it true representative government cannot endure. In this the press is charged with a great responsibility. We must do everything possible to push forward the study of English, and make English the language of the people of the islands. Nothing will do more to strengthen the spirit of solidarity and aid in developing an instructed, sound public opinion than a common language.

"The establishment of a sound, stable, representative government in the Philippine Islands must not fail, for the far-reaching effect of the efforts which we have made here, in the Orient, to establish such a government extends far beyond the limits of the Philippine Islands ; indeed, it reaches out to every people who are dreaming of liberal institutions and of government by the people. It shall not fail, because the United States has put its hands to the plow and will not turn back.

"In the great work before us I bespeak your co-operation and assistance. Working together, we cannot fail."

* * *

The Keys of Empire

IN an article entitled "The Keys of the World" appearing in the April number of THE FAR EASTERN REVIEW, the strategical position of the Philippines was reviewed in the light of their post-bellum importance. The Philippines have become the keys of empire, the buffer between Asia and Australia, the guarantee against attack upon India from the East, and upon Japan from the South. Independence of the Philippines must carry with it the ability to preserve their neutrality by the creation of a defensive force of sufficient strength to ward off invasion and prevent the use of any of the islands as submarine bases. That this point was sound is now seen in the fact that the first step to be taken by Governor-General Wood is the creation of such a force. The Philipino must stand the burden of taxation for his own defense. Without this, independence of the islands would be impossible.

Lord Northcliffe, during his visit to Manila, was quick to see the above point and marvelled that the Filipino should ask for independence, when they are far better off than Australia or Canada which have to pay a large portion towards their own defense. During his stay in Sydney he also sensed the danger to Australia from overcrowded Asia and stood amazed at the indifference of the Australians to their future.

The one barrier to the southward movement of the overcrowded millions of Asia is the Philippines, the stepping stone to New Guinea and Australia. No human power can regulate this racial flow towards the islands of the south seas if the Asiatic is deprived of his right to exist in Asia. If the waste lands of China are to be inherited by the Slav, if Japan is denied the right of colonization on the mainland, then the danger to a white Australia predicted by Lord Northcliffe cannot be averted.

* * *

Getting Down to Business in the Philippines

IN this number of THE FAR EASTERN REVIEW appears two articles on the Philippines, one from the pen of Mr. George H. Fairchild, unquestionably the foremost authority on the sugar industry in the islands, and the other from Mr. Warren D. Smith, the highest government expert on their mineral resources. Mr. Fairchild makes an earnest plea for the admission of Chinese labor as holding out the only hope for the further development of the sugar industry, while Mr. Smith laments the failure of American capital to develop the mineral resources of the islands, to the extent that the industry has depended in the past and must still, to a large extent, fall back upon New Zealand, Australia. and *China Coast capital.* Both of these gentlemen, experts in their respective industries, have placed their fingers on reasons why the islands have lagged behind and why they will continue to be a liability until a new program is designed and put into practice.

The root trouble with the development of the Philippines is the natural disinclination of the native to hard work. The keynote of American policy in the islands, the groundwork of our experiment in colonial government, is education, with the result that every high or primary school graduate adds one more aspirant for clerical or other tasks calling for little or no physical exertion. The present generation, the product of this system, is pre-eminently intellectual, with a craving for politics and government jobs. Another ten or twenty years of American rule along these same lines will turn out a new generation fitted for everything in life except toiling in the paddy, hemp or sugar fields. Who, then, will furnish the labor so that the intellectuals can exist?

Let us turn to a dispassionate consideration of a few cardinal, incontrovertable and perhaps, unpalatable facts, and try and see where a continuation of the present system will lead us.

1. An independent Filipino republic carrying an Asiatic exclusion law on its statute books is an idle dream. Neither China or Japan would consent to the extension of the principle to an Asiatic country, once the protection of the United States is withdrawn.

2. The United States government is compromised to concede independence to the Filipinos when they reach that stage where they are competent to govern themselves. That day cannot be indefinitely postponed.

3. The first requisite to independence is ability to safeguard it, and preserve neutrality in the event of a Pacific conflict.

4. To maintain an effective defensive force and fulfill their international obligations, the Filipinos must stand the burden of taxation.

5. Revenues for the maintenance of such a force can come only from exploitation of the resources of the archipelago.

6. Industrial development on any scale of magnitude sufficient to assure adequate revenues, depends upon investment of capital and willingness on the part of the natives to make it productive. Experience tends to prove that the Filipino can never be depended upon to provide the labor that will make such investments either desirable or profitable.

7. The concensus of opinion amongst practical business men is that the native will never supply the labor necessary for profitable development of the insular resources, and unless Chinese are admitted, the future holds out little hope for any great expansion of industries.

If we accept the above, we have the following formula. The United States are compromised to grant independence to the Filipino; this carries with it the elimination of Asiatic exclusion laws; ability to maintain independence rests upon increased revenues in order to pay for an adequate defensive force; this can be derived only from development of industries and resources, impossible under present labor conditions. What is the solution? Why not accept the inevitable, repeal the exclusion laws as far as they extend to the Philippines, and permit the entrance of Chinese labor (under certain restrictions) that will develop the much needed industries and bring revenues to the insular treasury. In no other way does it appear possible for the wealth of the islands to be properly developed within a reasonable length of time, and provide revenues to enable the United States to turn them adrift under conditions that will permit us to entertain a reasonable expectation that the infant republic will survive.

Although the plea of Mr. Fairchild has been shelved, the question must again come to the fore and receive serious consideration from the American and Philippine governments, if the former is ever to be in the position to carry out its pledges. Aside altogether from this phase of the question, the Philippines are a storehouse of tropical wealth, of necessary raw products which other peoples of the world will demand in yearly increasing quantities. If the natives refrain from contributing voluntarily their quota to the expanding necessities of mankind, the day will inevitably arrive when pressure will be brought to bear on them to work and produce, or make way for others who will. The Philippines lie at the door of other virile, hardworking and expanding nations, who, as time passes, will never consent to the islands being isolated, and closed to the entrance of their people with equal opportunity to trade and to own land. Other nations, not so altruistic as the United States, may decide that the islands in other hands will contribute their resources more usefully to the necessities of mankind. The time is past when a country like the proposed Filipino republic can be held for the Filipinos and bar out foreign capital seeking to develop sources of much needed raw materials.

Adhering to the argument advanced by Mr. Fairchild, the day is not far distant when the millions of Asia will look more and more to the Philippines for their supply of sugar. As Mr. Fairchild points out, the islands of Java and Formosa have about reached their limit of sugar production. Their rapidly increasing population will require more and more land on which to grow rice and food stuffs, and sugar must give way to the more necessary staples. Japan is constantly increasing her consumption of sugar, and when the Chinese masses cultivate a taste for the higher grade product, the Philippines will be called upon to meet the demand. What has been done by Japan in Formosa and by Holland in Java can be duplicated in the Philippines, but all inducements and subsidies, in addition to free trade with the United States, will not suffice to develop the industry if the natives refuse to furnish the labor, and their government enacts laws barring out people who will.

The question is one that has a most important bearing on the future of the islands. Unless the American people are willing to shoulder the responsibility as Mrs. Elenor Frances Egan puts it, of preserving "the Philippines for some Filipinos," the labor problem with its corollary, the Asiatic exclusion law, must be squarely faced. We do not believe that the altruism of the American people will rise to that height, where they will consent to stand guardian over one Asiatic nation to preserve its lands from development by other Asiatics. As long as America continues to approve of the enforcement of laws in the Philippines designed to meet the peculiar economical and labor problems at home, the Filipino laborer will be protected against competition. Under our wing the native politician catering to the labor vote, will continue to agitate against the admission of Chinese and to prohibit Japanese from owning land.

The initiative in this matter must be taken by the Filipino legislature which has full power to pass the necessary laws providing for the admission of alien labor. It is hardly probable that the American government would veto or interfere at this time with the right of the Filipino to provide ways and means that will pave the way towards the fulfillment of its promises. If the Filipino is to enjoy independence at some future date, no time should be lost in the enactment of a law to regulate the immigration of aliens into the islands under some form of contract that will stimulate investments for the development of their resources. The land laws should be revised in order that capital can take up sufficient land for development, and under conditions that will guarantee that such rights will not be abrogated or properties confiscated under legislation similar to the recent attempt to penalize all foreign holdings under pretext of keeping the Japanese out.

As long as Americans are reluctant to invest in the islands, their future prosperity must necessarily depend to a large extent upon investment of capital from nearby countries. There is no good reason why Japanese capital should not assist in this development. The islands produce many staples required by Japanese industry. There is no good reason why Chinese capital should not be invited into the islands, but it is rather far-fetched to ask the Chinese to invest in Philippine enterprises while excluded in person. As illustrative of this point, we again turn to the statement of Mr. Warren D. Smith, in regard to the necessity of the mining industry falling back on China coast capital for its development. At the present time, a representative of one of the largest mining enterprises in the Philippines is in Shanghai endeavoring to have the shares of his company listed on the local stock exchange. Owing to a previous disastrous experience with Philippine mining shares, the local brokers are rather opposed to any further transactions in insular enterprises, and despite the gilt-edged character of the shares in question, considerable difficulty was experienced to obtain official stock exchange recognition that will permit the shares to be dealt with on the Shanghai market. People in the Philippines labor under the impression that China Coast capital is necessarily foreign, when as a matter of fact, a large percentage of capital in recognized share companies, represents Chinese investments. To ask the Chinese to take an interest in developing Philippine mines or other industries, and then close the door to their entrance, is, to say the least, the height of inconsistency.

A bill has recently been introduced in the Philippine legislature to remove the restrictions on immigration, so that within the next few years, the population of the islands may be increased to 50,000,000, indicating that the thoughts expressed in this article are receiving serious consideration by Filipino politicians. The measure is expected to meet with strong opposition from the native labor unions who fear the effect of competition. Their fight is championed by Mr. Manuel Quezon who derives his political support from this element. At the same time, this gentleman is the foremost advocate for independence, and would rather see the islands "run like hell under its own government" than continue to remain dependent upon the United States. But it is safe to say that unless some solution is found to this labor problem, that not only will the Philippines be run in the manner aforesaid explained by the illustrious and forceful Filipino orator, but their very name will become synonimous with the same superheated locality.

Of course, if the United States is to remain the perpetual guardian of the Philippines, it makes little difference whether the native is encouraged to work or not. And here we come to that phase of the question embraced in a recent resolution of the American chamber of commerce of Manila advising against the investment of American capital in the Philippines until a permanent political status or territorial government is obtained. This decided stand was rendered necessary because of governmental antagonism to American investments and lack of suitable guarantees and protection. Only in the large commercial centres, the chamber declares, such as Manila, Cebu, Iloilo and Zamboanga can even partial protection be obtained, while the provinces are no longer suitable for American investment or business operations owing to the lack of protection from political antagonism.

In other words, the American community in the islands have set themselves firm against any further hazarding of American capital in the islands, unless a permanent governmental policy is adopted. It is difficult to reconcile the business man's cry for territorial government (implying an indefinite prolongation of American rule) with oft-repeated official pledges to grant independence. A territorial status will perpetuate exclusion of other Asiatics and impossibilitate any great development of insular resources, with the result that Americans holding properties in the islands, would stew in their own juice.

It is natural, however, that American business-men in the islands should desire to continue in some form or other the attachment with the homeland, for once the bond is severed, the bottom will drop out of business and the work of years be lost. We are convinced, however, that the political problem will solve itself if the labor question is properly handled. Once American and nearby capital is satisfied that their investments in the islands will be secured against confiscatory laws designed by immature politicians, and that the necessary labor will be forthcoming to permit them to operate profitably, the political atmosphere will be cleared for all concerned. Sentiment in the shape of the native labor vote may defeat the efforts now being made to remove the restrictions on immigration, but common-sense tells that only by the rapid influx of Asiatic immigration will the islands ever come into their own.

* * *

"The Scandal of the Shanghai Mint"

THE October number of the *British Chamber of Commerce Journal* of Shanghai, sets forth at length the British protest against the Chinese government's idea of a fair tender as embraced in the methods employed in placing the contract for the Shanghai mint.

The *Journal* says that " to begin with, the fact may be recalled that the project of having a mint in Shanghai is largely due to the energy of the associated British chambers of commerce and to articles which have appeared in this paper. In October two years ago the *Journal* published an article called "The Dollar *versus* the Tael" which, after showing how the dollar had of recent years tended to oust the tael, took up and added to practical suggestions for currency reform made by the foreign exchange banks in 1917. The first of these suggestions was that the foreign banks, acting together, should intimate to the Chinese government that they were prepared to wipe out the tael from their accounts altogether, provided the government would open a mint or mints for the free coinage of dollars. In the following month, when the British chambers of commerce in China and Hongkong held their first conference, Mr. A. G. Stephen, then manager in Shanghai of the Hongkong & Shanghai Bank, moved the following resolution, which was seconded by Mr. C. A. Fraser, representing the Hankow chamber, and passed unanimously :—

" That the Chinese government be strongly urged to take steps to discontinue the use of sycee and to establish a uniform currency of dollars and subsidiary silver and copper coinage throughout the country ; to open a mint in Shanghai for the free coinage of dollars and to place other mints under efficient control, so that uniformity of standard may be preserved."

" The effect of this resolution was more immediate than most people at the time expected it to be. By the 30th of the following month, December, the proposal to build a mint was being taken up in a business way and by March 10, 1920, Mr. M. Y. Chung, chairman of the mint commission, was in communication with firms in Shanghai. He had no specifications of his own at that time and declared himself willing to consider suggestions put forward. On may 6, 1920, quotations were sent to him and on May 12 he acknowledged their receipt and trusted to be favored with details at any early date. On May 29 he wrote to the effect that as soon as detailed suggestions had been received from all firms interested he would fix a date on which all were to tender formally."

" Throughout this preliminary period the mint commission's policy was businesslike, straightforward and fair. It was, to all intents and purposes, in this position. 'We want' it said to British and other firms, 'to build a mint. We have no pre-conceived ideas on the subject. In fact, we have no details to set before you. We can indicate to you, roughly speaking, what the capacity of the proposed mint is to be and we want you to let us know how, if we asked you to build and equip it for us, you would set about doing so and what it would cost. When we have got your ideas we will issue a set of general conditions, fix a date for the receipt of your formal tenders and choose what we consider the best tender put forward.'

" It was on this basis that British firms set to work and, needless to say, they went about the business in a thorough, painstaking way, sparing neither time nor money to get out preliminary quotations. This work occupied them till November 1920, when, the mint commission issued the following specifications. :—

The *Journal* then goes on to quote the general specifications issued by the Chinese government mint commission calling for the detailed estimate of a complete minting plant with capacity of a daily output of 400,000 finished silver dollar coins, working actually ten hours a day, or the alternative output of 600,000 subsidiary coins (50-cent, 20-cent and 10-cent pieces in equal proportions) using the same power plant and preparatory machinery but with extra coining presses and accessories for the same period (during which the mintage of dollar coins, is, of course, suspended). Tenders for this plant were to be sent in not later than November 16, 1920, and in accordance with the above, tenders were submitted by one Japanese, three Chinese, four Americans, one Dutch and six British firms.

Naturally, the interested tenderers thought that this would lead to the placing of the contract, but to "the amazement and disgust of the British firms concerned, on May 6 of this year, an entirely new set of specifications were issued," to be sent in not later than 11 o'clock on June 24, 1921. The form of tender had to include every item of the complete coining equipment, with details of costs of each item of the various appliances in gold currency.

Then followed a complete list of each item specifying in every case some special product of American make, even to the electric motors. Taken with the time limit of fifty days in which to get specifications home, examine them, work them out, make out prices and return them with blue prints to Shanghai aroused not only the ire but the disgust of the British firms who had taken such pains in the beginning to make a careful study of the project. This feeling was heightened from the fact that the new set of specifications were signed by Mr. Clifford Hewitt, the newly appointed American technical mint expert to the commission.

When the altered specifications were published the British chamber of commerce at once wrote to the British minister at Peking, and on July 15 was informed that a protest had been lodged and met with an unsatisfactory reply, of which the following was a part :—

> "In the purchase of all the machinery for the Shanghai mint the criterion employed for the pattern of such machinery is suitability for Chinese use. Manufacturers of all nations are free to compete and there is no intention to impose restriction in respect of the merchants of any particular country. Moreover, the matter lies within the sphere of the administration of the mint, and the director of the mint enjoys by right freedom of action and of selection nor does he indeed submit to any restriction whatsoever."

This rejoinder was followed by a further protest to the finance minister and the currency bureau replied by repeating their former statement as to the absence of any restriction of important parts of the contract to machinery manufactured in any particular country, and by asserting that the time limit, 50 days, was more than ample for enquiries as to price to reach British manufacturers by mail. A summary of this second reply was sent to the chamber on September 9, seven days precisely after the issue by the mint commission in Shanghai of further specifications, namely, for strong room doors, safes and fire-proof safe cabinets, while amongst the photographs attached to the specifications is one showing a Herring Hall Marvin strong room door, which can only lead to the conclusion that the order will go to that company. And this second set of specification is issued after the protests made by H.M. Legation detailed above."

"Time was when such protests were listened to adds the *Journal*, and time was also when the Chinese government, had some sense of commercial decency. That time appears to have passed and the *Journal* commends the fact, and the others contained in this article, to the attention of the British public both in China and Great Britain and in particular to such representative associations of British manufacturers as the Federation of British Industries."

Here we have a typical case that as time passes must be repeated time and again in some form or other. The British position seems to be well taken, and if the shoe was on the other foot, Americans would protest just as loud and just as strong. The real difficulty undoubtedly lies in the methods pursued by the Chinese authorities in the first instance by inviting general tenders from all sides, then throwing them out and calling in an American expert, who most naturally specified, what his judgment deemed the best machinery procurable. There could have been no criticism or hard feelings had the Chinese called in the services of such an expert in the first place and invited tenders on his specification. That, undeniably, is the prerogative of the Chinese government. Had the expert been British or French, his recommendations would undoubtedly have favored the manufacturers of his own country. In this case, he was an American, with the natural consequence that all the machinery specified is American.

It is difficult to hope for harmony when such practices are permitted to rule the placing of Chinese government contracts, for with this precedent, the next time a British or French expert is called in for any particular engineering advice, we may expect that American machinery will be conspicuous by its absence from the specifications.

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Courting Disaster

NOTWITHSTANDING an official warning issued by the ministry of agriculture and commerce, against the investment of foreign capital in Chinese stock and produce exchanges promoted in the treaty ports, the number of these bucket shops is constantly growing. Hardly a week passes without the registration of several new enterprise of this character, until one stands amazed at their variety and scope. For the purpose of protecting the interests of the public against dishonest speculators, the above-mentioned ministry in August sent an official dispatch to the waichiaopu requesting that the legations be notified to caution their nationals against joining with dishonest natives in forming these so-called exchanges without government sanction. The minister was firm in his belief that unless the evil be checked in time, it will work havoc on Chinese commerce industry and finance, and impede economical reconstruction. He affirmed that Chinese promotors had induced foreigners ingorant of Chinese laws to form these joint exchanges in the hope of utilizing the protection of a foreign flag in order to evade the imposition of Chinese laws and taxation.

The creation of these exchanges, however, fails to keep pace with the new banks springing up like mushrooms all over China, in many cases promoted by officials in control of national, provincial or municipal finances, and whose aim is to speculate in Chinese bonds and loans. The extent of these transactions is revealed in a recent summary made by the *Kuo Wen News Agency*, which shows that during the past several months a sum exceeding $40,000,000 has been advanced to the Peking authorities all secured on the salt surplus. Some of these loans have been made by established and reputable foreign banks, but the list shows names unheard of a year or so ago in Chinese finance.

More than 50 different loans through 20 odd banks make up this huge sum. The larger part of the money comes from Chinese banks, but the foreign banks have loaned not a small amount to Peking.

The Bank of Communications has lent $4,000,000 in two payments ; the Russo-Asiatic Bank has made 12 loans, $1,000,000 the first time and smaller sums on various other occasions. A loan of Marks 5,000,000 was also made by the Russo-Asiatic Bank, which has loaned in all about $4,000,000 ; the Putung Banking Corporation (backed by the Yokohama Specie Bank) $3,000,000 ; the Pien Yih Bank, two loans totalling $1,750,000 ; the Peiyang Commercial Bank, twice, totalling Y.120,000 and Y.1,200,000 ; the Hongkong & Shanghai Bank, four times, totalling $1,200,000 ; the Exchange Bank of China, $500,000, Y.4,040,000 and Marks 500,000 ; the Yen Kee Bank $1,000,000 ; the Shen Kee Bank, twice, totalling $800,000 ; the Ming Hua Bank, $500,000 and Tls. 700,000 ; Asia Development Co. Y.2,500,000 ; Ko-ngo Bank Y.450,000; Okura Co. Y.2,450,000; Bank of Commerce, Frs. 4,250,000 ; Yung Tah Bank, Frs. 1,000,000 ; and the Sino-Italian

Bank, Lire 1,200,000. Other banks have loaned smaller sums of from $200,000 to 300,000 to the extent of $1,600,000.

The total amount of the salt revenue is $80,000,000 per annum, but with the southern provinces, as well as Chang Tso-lin and a few military leaders in the North, withholding their shares, the actual income received by Peking from this source is about $12,000,000. This amount certainly is not enough to cover these loans amounting to $40,000,000, plus interest. If this is kept up even next year's surplus and the year after next will not be sufficient.

The year 1921 will go on record as the most memorable in the history of China's finances, a year of robbing Peter to pay Paul to escape national bankruptcy. How long it can last, only the Chinese themselves are able to tell. The day the orgy is over, and the chief business of many mushroom banks is withdrawn, it is not improbable that a panic will be precipitated that will carry many foreigners down to ruin in the general crash.

* * *

Baiting the British

"*NORTH of the Yangtze for Nippon, south of the River for Britain, a slice of Liangkwang and a nibble of Yunkwei for France, if, unlike little Jack Horner, she sits in a corner and keeps her fingers out of the Anglo-Japanese plum pie.*" Sounds like a mandarin nursery tale filled with plum pudding, suspicious cheeses and greedy little boys gorging themselves with Celestial delicatessen.

Yet this is the story set in circulation two years ago by Mr. Thomas F. Millard and notwithstanding its absurdity, is now resurrected by The New York *American*, which assures its readers that it is in possession of facts proving that the British government is very active at this time in separating China from portions of its territory. The instrument in this up-to-date repitition of Germany's exploit in Shantung, is no less than the well-known British firm of Butterfield & Swire, who, according to *The American's* informants, has grabbed the foreshore of Amoy in South China, hoisted the Union Jack and taken possession in the name of King George. Regular old land grabbing stuff, which *The American* solemnly assures its readers is ample evidence of the existence and operation of the secret compact between Japan and Great Britain (unearthed by Millard) which gives to the latter exclusive domination in territories south of the Yangtze.

We have always sensed that "Taikoo" was aggressive and lived up to its motto (*Esse cuam Videri*), which worries every passenger who boards a China Navigation steamer for the first time. We know enough of its history to understand that the company will not meekly surrender without a stiff fight any commercial advantages it may have fairly won in ships, sugar or sundries, but we never suspected until reading *The American* that their legitimate acquisitiveness had expanded into land-grabbing for the glorification of the British empire. The story, vouched for, according to *The American*, by southern Chinese authorities, bore the earmarks of another phase of Chinese propaganda to stir up sentiment against British interests because of the alliance with Japan. The facts surrounding this "flagrant abuse of power against a poor, weak and defenseless people," were not difficult to obtain.

Away back in 1900, the British shipping firm of Butterfield & Swire (more familiarly known by its Chinese hong name, "Taikoo") obtained permission under specified conditions from the taotai of Amoy to erect what is known as a "flying bridge" or a pier connecting the island of Amoy with the hulk of the China Navigation Company moored in the harbor; purely a commercial accommodation to facilitate the loading and unloading of cargo, a permit such as the average steamship company has to obtain in any port in the world to erect a wharf or other special facilities for its exclusive use. For ten years this structure served the purpose for which it was erected, but owing to deterioration and damages suffered as the result of a heavy typhoon, the pier became unsafe, a menace to life and property. It was decided to demolish it, but "Taikoo" with an experience of half a century in dealing with Chinese officials, before doing so, followed closely the rules prescribed for such cases by writing to the British consul of their purpose, who, in turn, officially communicated with the taotai.

The Chinese official acknowledgement is characteristic. After acknowledging receipt of the consul's letter setting forth the intention of "Taikoo" to demolish the pier and rebuild it at a later date, it concludes by stating that the maritime sub-prefect had been instructed to take note of the matter. The Chinese official did not give notice that the reconstruction of the pier would be opposed, so the note constituted a practical and legal acquiescence in the proposal and was so interpreted by the British consul at that time.

Before they could get around to the rebuilding of the pier, the war broke and it was not until last year that the firm was again in a position to proceed with its plans. Work was started on the new pier last spring, when the Chinese authorities issued a public notification opposing its construction, equivalent to an official boycott and a threat to punish any laborer who might work on the pier. Apparently, there are no two sides to the case. The British firm have an understanding with the Chinese government which the latter is attempting to abrogate. The great land-grabbing incident, brought to light by *The American* in order to give reality to Millard's bogey, reduces itself to an attempt on the part of the Chinese authorities to repudiate undertakings given by their predecessors. As "Taikoo" has acted all through in good faith and in full accord with the prescribed rules, it is not surprising that the British government is now firmly insisting that the Chinese live up to their obligations. This seems to be all there is to the story, the awakening from the nightmare conjured up after reading the editorial in *The American.*

* * *

Beans and Japan's Breakfast

IT is not often that statesmen publicly advertise a particular section of the world in advocating a more general use of its products. In the speech of Mr. Winston Churchill in London on September 28, on the breakdown of markets and purchasing power, he invited attention to the great possibilities of the humble soya-bean, a product of Manchuria, now recognized as one of the world's great staples. "It is a matter of the highest importance," he said, "that the West should learn the lesson of cheaper standards of living which is taught them by the peoples of the East in the adoption of the soya bean as an article of food. Given the existing situation on the continent this is the only real solution of the problem of reconstruction."

He went on to say that in a statement made to *The Times* Vienna correspondent by Dr. Berozeller, a young Hungarian who is experimenting with soya as a food, Berczeller professed to have succeeded in creating three kinds of foodstuffs from the soya bean, namely, bread, flour and milk in which the biological factor had been taken into account, and it is like "manna."

The bread is the cheapest on the market and is very palatable, and easily digested while the "manna" milk is very similar to cow's milk at one-sixth of the cost.

The doctor suggests that these foodstuffs are suitable for use in combatting the famine in Russia owing to their cheapness, compactness and the speed with which they can be produced, while the diffusion of these foodtsuffs would lead to the permanent cultivation of the soya bean in the Ukraine which would be important in the future provisioning of Europe.

It has long been known that the soya bean cake contains a large percentage of nutriment sufficient to be used more generally as food for human beings. Instead of being used for this purpose, it finds its way to Japan and South China as fertilizer. A market for its use as cattle-food was created in Europe before the war, but this seems to have fallen off. The output of the bean mills along the line of the South Manchuria Railway for the fiscal year 1919 was 1,462,000 tons of bean cake valued at Y.99,800,000 and 151,000 tons of bean oil valued at Y.22,650,000. In the same year 19,693,000 piculs (1,158,000 tons) or 79 per cent. of the total output of bean cake went to Japan.

Japan's staple rice crop depends to a large extent upon the uninterrupted supply of this cheap fertilizer, and when this fact is understood, considerable justification is seen in a policy directed towards preserving ready access to a commodity, without which, her very life would be jeopardized in the event of serious disturbances in Manchuria or the possibility of China prohibiting its export or in other ways obstructing trade by the imposition of extra taxation. Japan, unlike Boston, may not eat beans for breakfast, but without the beans, the breakfast or her masses would suffer a marked decrease in their favorite food. In the event that Japan's rice crop should fail or become insufficient to satisfy the demands of a rapidly expanding population, a crisis may arise when the Manchurian "manna" may save the nation from starvation.

It is true that the argument might be stretched to cover China, but in this country famines, due to crop failures, are made possible because of the lack of transportation facilities which prevent supplies from other sections being rushed into the stricken areas.

* * *

The Port of Kobe

JAPAN is determined to protect her good name against the repeated accusations of practicing underhand discrimination against the trade of other nations. The phrase "discrimination so subtle that no proofs can be obtained" has struck home, and revealed to Japan, more than anything else, the full extent and enormity of the secret campaign waged for several years for the purpose of discrediting, and in the event of hostilities, exposing her to the enmity of the whole world. In our last issue we invited attention to the immediate action taken by the South Manchuria Railway Company to preserve its good name when the situation was explained to the president at a dinner given in his honor at Mukden. Special agents of the railway are now stationed at Mukden, Newchwang, Changchun and Antung, whose duty is to investigate and correct at once all complaints that may be brought before them.

In our September number, we also revealed something of the campaign to discredit the port of Kobe based on complaints of discrimination against foreign shipping during the war. Here again, we find the Japanese authorities keenly alive to the danger to national prestige involved in further misunderstandings of their management of the port. To cope with this menace to international goodwill, the prominent business men of Kobe have organized the Kobe harbour investigation committee.

In his speech at the opening session of this committee, Governor Ariyoshi pointed out that, notwithstanding the fact that the port authorities were always impartial in allocating the use of buoys and harbor facilities, certain foreign steamship lines are inclined to believe that preference is invariably given to Japanese steamers. The purpose of the commission was to dispel such misunderstandings and convince foreign shipping interests of the fairness of the port administration. This, he added, was indispensable for a bigger trade and a greater port of Kobe.

One of the difficulties in the present administration of the port arose from a conflict of authority on the part of three different government offices, the harbor police, the customs and the port offices, all working independently of each other, and with offices situated in three different section of the city. The steady growth of the trade of the port, increasing from a tonnage of 2,903,732 with a value of Y.377,298,537 in 1911 to 4,486,013 tons valued at Y.1,646,564,087 in 1920 called for a huge expansion scheme in the area of the harbor, with wharves, warehouses and other terminal facilities. The present area of the harbor (approximately 2,200,000 *tsubo*) is to be increased to 3,450,000 *tsubo* provided the scheme is approved by the commission.

Naturally, with such an immense undertaking before them, involving the expenditure of many millions of yen, the authorities are awake to the necessity of maintaining the reputation of the port at a high standard. The creation of the Kobe harbor investigation commission, must be accepted as an effort on the part of reputable Japanese interests, backed with the full support of their government, to do away with such misunderstandings as culminated last year in an official denouncement of the port in a letter from the American secretary of commerce to the chairman of the United States shipping board. The personnel of the commission is a guarantee to foreign shipping interests that such misunderstandings are a thing of the past, that Kobe welcomes and is prepared to make considerable sacrifices in order to hold the good will and friendly co-operation of all foreign interests.

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The Boxer Indemnity

IN discussing Japan's policy towards China with one of the highest officials in the present Japanese government, he frankly admitted that Japan would not be adverse to remitting her share of the Boxer indemnity, either in whole or in part, if an opportunity presented where it could be done without creating misunderstandings. He said that if Japan was to surrender her share of the indemnity under an agreement with the Peking government, the South and anti-Japanese foreign interests, would denounce this purely friendly act as another attempt to purchase the North and support it against the South by underhand financial assistance, and be construed as a violation of the consortium understanding, so, no matter how unselfish Japan might be in this matter, nothing could be done until a united government was firmly established in China.

The desperate financial condition of China has provided the opportunity for a concentrated campaign in foreign countries for the total remission of the Boxer indemnity following the precedent set by the American government to have the funds employed for educational purposes. Feeling that the benefits accrueing to American trade and prestige in China through the remission of the indemnity, has placed British interests at a distinct disadvantage, a movement has been initiated to influence the British government to adopt this practical method of demonstrating its friendship for China. Naturally enough, the Chinese minister to Great Britain, Dr. Wellington Koo, seized the occasion to further a campaign, that, if successful, must win for him the undying gratitude of the Peking government.

Addressing a convention of Chinese students at Swanwick, near Derby, Dr. Koo said that Great Britain was one of the best schools for training leaders of men, and the presence of more Chinese students would be of mutual far-reaching benefit. It would make the two nations understand one another better, and facilitate the rapidly gowing intercourse between the two peoples.

"Each Chinese student educated in Great Britain was not merely a sure consumer of British goods, but also a rallying centre for them. Intuitively he would prefer to place his orders for foreign goods with the manufacturers of the country he knew best."

"The practical question how more Chinese students could be encouraged to come to Great Britain brought him to the question of the Boxer indemnity. The annual instalment still due to Great Britain, including principal and interest, was about £400,000, and there were twenty-three more instalments to pay. The unpaid portion would provide China with means of sending one or two hundred students here every year."

There is little doubt that in the long run British trade and prestige in China would receive a great stimulus as a result of the remission of the British share of the Boxer indemnity, but with the present feeling in Canton, such an act of friendship would be construed as a covert attempt to bolster up Peking at the expense of the South. The viewpoint of Japan would seem to cover the situation from all angles. The greatest benefits to China as a whole from the remission of the indemnity, can come only through a united country, the establishment of a stable government having the support and confidence of the entire people.

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Engineers All

> **"We, the Presidents of the four American National Societies of Civil, Mining, Mechanical and Electrical Engineers, on behalf of our Councils, send you our good wishes. We have instructed our representatives attending the Conference in London on June 29, 1921, to express our feeling of brotherhood and our deep sense of loss in the death of so many of our British colleagues on the battlefield. The soil beneath which they lie will always be sacred in the eyes of American engineers. We record here our sense of obligation to the naval engineers and constructors whose work enabled the British Navy to keep the sea as the first line of defence. We of America rejoice that we were permitted to share with the engineers of Belgium, France and Italy and with the men of our own blood the final victory over a war spirit dangerous alike to the rights and happiness of men. We glory in the memory of having stood by your side in battle, a guarantee to people of the British Dominions that the American Union will be always ready to give themselves in a like cause. With our greetings we pray that the engineers of all nations may dedicate themselves anew to justice and peace and to the service of humanity in a better and nobler fashion. We beg of you to accept this expression of esteem and goodwill as the voice of your colleagues and brothers of America."**

IN the above glorious words the four great American engineering societies paid tribute to the engineers of Great Britain, France, Belgium and Italy on the occasion of the last conference of the Institution of Civil Engineers. It breathes the true spirit, the sentiment of broad-minded, big-hearted men upon whose shoulders fell the brunt of keeping the war going to its victorious conclusion, words of heartfelt appreciation of the immense sacrifices on the part of British engineers that made victory possible.

It is in this spirit that THE FAR EASTERN REVIEW has taken up its post-bellum work in China, where, more than in any other place in the world, the British and French engineers have suffered for their contribution to the cause of civilization. For six long years they were deprived of a market created largely through their initiative and investments. American manufacturers of engineering products were the beneficiaries of this sacrifice.

It is natural that American firms should desire to hold their war-won position, but we maintain that no undue advantage should be taken at this time to hamper the efforts of the British and French engineers to re-establish markets created through their pre-war activities. The entire world owes a deep debt of gratitude to British engineers, who, having fulfilled their duty, re-enter the the competition in China, asking nothing more than a "free field and no favor," on one hand, and on the other, a modest request that China complies with past committments in giving their products a preference in such few instances where their capital and enterprise have created the demand.

THE FAR EASTERN REVIEW echoes the message of American engineers to their colleagues in Great Britain, and looks forward to the time, not far distant, when this sentiment will rule in China.

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The Kiangsi Railway

AS the time draws near for repayment of the $7,500,000 advanced by the East Asia Company to the Kiangsi Railway Company (a provincial concern operating the line from Kiukiang to Nanchang), considerable alarm is being manifested in Chinese circles because of the company's inability to meet its obligations. These fall due in May 1922, and according to the loan provisions, if the interest and principal are not paid on that date, the Japanese company is at liberty to take over the administration and operation of the line. Recently, Mr. Tsai Ju-kai, former civil governor of Kiangsi, was elected managing director of the railway. He then proceeded to Peking to enlist the support of the government in repaying the debt. The railway ministry was willing enough to take over the responsibility, but in view of the empty condition of the treasury and the demands upon the railways for funds to run the government, as well as the prospect of meeting the amortization payments due next year on other railway loans, this plan had to be abandoned. If no other solution offers, the Kiangsi Railway Company, it is now reported, will negotiate another loan from the Japanese for the extension of the line to Kwangtung and Foochow, because its present length is too short to make further operation profitable.

Here we have another complication, that on the surface, was meant to be dealt with by the Consortium, but as the East Asia Development Company is not included in the Japanese Group of banks, and consequently not a party to the Consortium, it will be at perfect liberty to proceed with such a transaction.

On the same principle that other lines have been excluded from the scope of the consortium, as coming under the heading of those on which substantial progress has been made, the Kiangsi Railway Company, a provincial and private Chinese corporation, is also at perfect liberty to negotiate with the Japanese for the financing of the extension of the line originally included in their provincial charter. The complication involved in this goes further, as the contract for financing and construction of the lines from Nanchang south to Canton and Swatow, was promised by Peking to the British firm of Pearson & Sons. Any attempt on the part of the Chinese to raise a new loan to repay the old one to the Japanese company, and provide funds required for the proposed extensions, will be hailed by other interests as an attempt on the part of Japan to push her influence deeper into this part of China. Yet a careful analysis of the situation reveals that this seems to be about the only thing the Japanese can do in order to protect their original investment, in the same manner that others are forced to provide new loans to Peking in order to liquidate old ones. The development of the Kiangsi railway question will be interesting to follow.

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International Bank Man as Japan's Adviser

WE learn that the Japanese foreign office has appointed Mr. Dallas McGrew as adviser for American affairs. Mr. McGrew is from the International Banking Corporation, and was at one time a consular officer in Japan. He is the son of a missionary, born in India and married a daughter of the late Richard Watson Gilder, for many years editor of the *Century Magazine*. Mr. McGrew is a Harvard graduate, and one of the pioneers of the movement for a better understanding between the United States and Japan.

Photo by Rembrandt

Left to Right—P. G. Hornell, representing the Chinese Chamber of Commerce; Dr. Isamu Hiroi, of Japan; F. Palmer, British member; Major-General W. M. Black, American on the commission; L. Perrier, representative of France; P. Ott de Vries, Netherlands representative; H. von Heidenstam, member ex officio and Engineer-in-Chief of the Whangpoo Conservancy Board.

The Port of Shanghai

SHANGHAI is indeed fortunate in having the advice of the world's foremost river and harbor experts to consider and advise upon the needs of its harbor. Whether Shanghai is to drop to the level of a second rate port or retain its position as the commercial door to Central China is a question this commission is now called upon to decide, a question that touches vitally the interest of every firm and property holder in the settlement and especially those pioneers whose private initiative is largely responsible for its present prominence.

It is not alone the engineering difficulties, but financial, commercial and above all, political obstacles will have to be met and surmounted. The engineering end of the harbor scheme will probably be met with in some proper feasible manner once a decision is made as to what is to be done. Before this however, the commission will be faced with reaching a decision of what, in their opinion, will be the depth of water necessary to handle the future ocean tonnage of the port. If Shanghai is to take care of the largest type of ocean carrier with a draft of 35 feet and over, then the engineering end becomes a question of either dredging the Fairy Flats, training the Yangtze to keep its channel open, or constructing an entirely new express port somewhere on the north shore of Hangchow Bay, where a depth of 35 feet and over can be found and maintained without undue expense. These various schemes were fully described and illustrated with plans in the June number of THE FAR EASTERN REVIEW.

Naturally enough, foreign interests of Shanghai who have contributed so largely to its development from a mud flat to the premier port of China, and many of whom are interested in medium sized ocean steamers, would prefer some plan whereby the Yangtze approach could be maintained, and the new port constructed in close proximity to and forming a part and extension of the present harbor system. Having in view the political difficulties with the Chinese authorities surrounding the construction of a new port on Hangchow Bay, where it may be taken for granted that all property rights would be held by Chinese, and at excessively high figures with the gradual deviation of warehouse and allied business to this new centre, vested interests in Shanghai must cherish the hope that some way will be found to retain the Yangtze estuary as the entrance to the port, even at a higher cost, which in the end, would be saved in demurrage and other fees and expenses incurred in the delays in entering and leaving the port.

Whatever the cost, it may be taken for granted that the trade of Shanghai must foot the bill in the same manner that the Whangpoo conservancy work has been so successfully financed. The Chinese government or the other Yangtze ports will never contribute directly to the development of Shanghai's harbor. Yet if the findings of the commission favor the retention of the Yangtze approach, then the whole question of the Yangtze conservancy from the gorges to its mouth, should be taken in hand. If, like the Mississippi, the Yangtze is to be trained to scour out and keep open its own channel, the improvements that will make this possible, may have to be carried far up the river in accordance with a carefully devised general program. Here, enters the old, old story of finance. With the experience of Chinkiang and other ports on the river, it seems almost hopeless that the Chinese government will make any move to provide necessary funds unless influenced by strong pressure from the other nations.

Yet any plan for the improvement of Shanghai's harbor must be based on its relation to the whole Yangtze Valley trade. It is not a local question; it rises above a purely Chinese problem into one of international importance. It is safe to predict that the Chinese government will not enthuse over any plan which might involve the training of the entire Yangtze, nor look with favor upon any extension of the present settlement limits for the construction of a new harbor in the lower Whangpoo. A Greater Shanghai sounds well on paper, but further growth must of a necessity conform to Chinese ideas, which, at the present time, seems set in opposition to any further encroachment on their sovereignty. So it would appear that quite apart from the engineering problem, the commission has to face a most delicate political one, in which the question of sovereignty and finance will assume greater and greater proportions.

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Development of Japan's Railways

THE fiftieth anniversary of the opening of Japan's railway service was celebrated in Tokyo on October 14th. The crown prince attended as the representative of the emperor, while the imperial princes, the diplomatic corps, the cabinet and more than 3,000 guests gave eclát to the occasion. After the crown prince had delivered a speech of congratulation on the faithful services of the railway officials and employees, the premier, railway minister and others followed with appropriate speeches.

The Development of Japan's State Railways

It is a fitting time to review the splendid progress made by Japan's railways during the last fifty years, and this can properly commence at the time the lines were nationalized.

The railway nationalization law in Japan was drawn in March 1906; and the acquisition by the state of the principal private railways was completed in October the following year. The main purpose of the nationalization was of course the unification of the system, the efficient operation and thorough control by one vast and powerful monopolistic hand namely, the government, such as was thought essential from the beginning in view of the inherent nature of this particular branch of public utilities.

Reorganization Under State Control

The state-owned railways, prior to the nationalization, were operated on the departmental system based on the principle of centralization. This worked tolerably well, inasmuch as the management then was a relatively small affair. At the time, however, the government assumed the control of the principal railways in 1906-1907, the centralization system was found inadequate and a reorganization was at once started. In December, 1908, the government railway bureau was removed from the control of the minister of communications and assigned to a newly created body, the railway board, which was made responsible directly to the prime minister of state for all matters relating to the operation of the state-owned railways as well as to the administration of private railways. The control was then decentralized, the whole system being divided into five jurisdictions, each of which had a directory of superintendent established.

The central administration was also materially changed. A further reorganization was introduced in 1910. The traffic and finance departments were reorganized out of existence, the chiefs of the various sections being brought into direct touch with the president.

In 1913, the finance and traffic departments were re-established with a view to ensuring uniformity of operation in the central administration. The work at headquarters was divided into two parts—technical and business. Technical affairs were placed under the charge of the director of the technical department while all business other than technical matters was apportioned among the president's secretariat, the private railway administration, the traffic and the finance departments. The principle of centralization, which was dominant in this revision, also placed the purchase and distribution of railways stores and supplies in the hands of a newly created officer, the controller of general stores, while the workshops were taken out of the control of the divisional superintendents and brought under the immediate control of the director of the technical department.

In June 1915 the central administration again underwent reorganization, whereby the local branch stores and the workshops passed again to the control of the divisional superintendents. The sections abolished in the previous revision were restored.

More complete reorganization and decided administrative change, however, were still waiting. In May 1920 an imperial edict was promulgated raising the position of the imperial government railways to a governmental department with a minister as its chief executive head. The railway minister, the newly appointed official, is a member of the cabinet, and is directly responsible to the throne. The duty of the railway minister is defined to be: to supervise the state-owned railways and the businesses connected with them and to administer, for the private railways and tramways. In addition to the above he is charged with the duty of administrating for the businesses connected with the operation of railways and steamer services of the South Manchurian Railway Co, Limited. The six departments (henceforth to be called bureaux), namely those of private railway administration, traffic, construction, engineering, mechanical engineering and finance, are still retained in the central office, while the number of the divisional superintendence offices are same as before, that is, six, comprising Moji, Kobe, Nagoya, Tokyo, Sendai and Sapporo divisions.

Finance and Capitalization

The finance of the state-owned railways prior to the nationalization was included in the general imperial budget, so that any balance accruing was to be turned over to the general account of the government treasury, and all the expenses for extension and improvement were met with by loans or taxation.

This accounting system was modified in 1906, and the new method was put into force from the fiscal year 1907-8, when a new regimé came into being with the suddenly expanded business of the railways, in consequence of the state acquisition of the seventeen private railways.

The capital of the state-owned railways at the time of nationalization, that is, on March 31, 1907, was estimated at Y.189,966,470. During the two years 1907-8 and 1908-9, the government paid Y.483,565,325 for the 17 purchased railways. Then big funds were subsequently disbursed upon new extensions and the improvement of the existing lines, in order to provide facilities adequate for the growth of traffic and for fulfilling the grand object of the nationalization. In consequence, the investments at the end of the fiscal year 1916-17 rose to Y.1,108,060,237, which means an increase of Y.354,173,249, or 47 per cent., as compared with the end of the year 1908-9, or the year when the account was completely settled for the purchase of the private railways.

The latest figures, that is, those of the fiscal year of 1919-1920, are given as Y.1,385,370,000.

Operation of State-Owned Railways

The actual conditions of the operation of the state-owned railways may be inferred from the following figures, which are taken from the statistics of the two fiscal years, those of 1913-1914 and 1919-1920:—

Item	Year 1913-14	Year 1919-20
Area (square miles)	129,247	129,247
Population	53,362,682	56,667,771
Total miles of main track worked (m. ch.)	5,470.71	6,202.26
Total miles of all tracks (m. ch.) ...	8,323.22	9,745.10

Item	Year 1913-14	Year 1919-20
Average area per mile of line (sq. m.)	23.6	20.8
Average miles of line per 100,000 of population	10.3	10.8
Average miles of line worked :		
passenger traffic	5,298.0	6,056.8
goods traffic	5,344.3	6,133.3
Number of stations...	1,529	1,776
Capital (yen)	973,091,496	1,385,370,000
Working revenue (yen)	113,477,055	310,330,370
Working expenses (yen)	54,551,246	202,816,792
Profit (yen)	58,925,809	107,513,578
Percentage of profit on capital ...	6.1	7.8
Balance (surplus) (yen)	19,794,315	59,886,096
Profit per train mile (yen)... ...	1.03	1.40
Locomotives...	2,500	3,121
Passenger carriages...	6,453	7,450
Goods wagons	42,705	51,065
Employees	112,087	158,807
Monthly compensation of employees (yen)	2,109,271	4,413,485
Number of passengers carried ...	167,773,143	357,881,989
Number of passengers carried one mile	3,690,964,619	7,942,712,144
Average number of journey per capita of population	3.1	6.3
Tonnage of goods hauled	36,348,362	59,903,957
Tonnage of goods hauled one mile	3,053,852,638	6,294,060,079

As regards the number of passenger carriages, which were 6,453 in 1913-14 and 7,450 in 1919-20, an increase of nearly one thousand, it may be remarked that the use of them in recent years has become more frequent and full, as will readily be seen from the comparison of the number of passengers carried in these two fiscal years given in the figures, 3,690,964,619 for 1913-14 and 7,942,712,144 for 1919-20. The unusual increase in the traffic has of course been caused by the conditions created by the European war. Similar remark also holds true in the case of the tonnage of goods hauled, which increased from 36,348,362 in 1913-14 to 59,960,957 in 1919-20, inspite of the number of goods wagons which was increased only from 42,705 in 1913-14 to 51,065 in 1919-20. The rates of working revenue and expenses have also increased out of proportion, as will be seen in the figures Y.113,499,055 of revenue and Y.54,551,246 of expenses for 1913-14 and Y.310,330,370 and Y.202,816,792 respectively for 1919-20. The cause of the increase of expenses is due to the advance of cost of materials and wages. The deficit has been covered partly by the increased traffic, making the comparatively small number of rolling stock serve greater end as already remarked. But in order to make both ends meet completely, it was necessary for the government railways to increase fares and rates. The fares were raised twice, 25% in 1918 and 27% in 1920, and the rates once, 20% in 1918. The increase in the number of employees from 112,087 in 1913-14 to 158,807 in 1919-20 has been partly due to the adoption for some class of workers of standard working hours which resulted in the shortening of individual hours of service, and partly to the growth of traffic.

* * *

China at the Pacific Conference

It is very often that criticism of any measure mooted by responsible or irresponsible parties brings into public focus and, therefore, public prominence, something which, because of its absurdedly ambitious or preposterous nature, were better left to fade into inconspicuous decline and die. There is grave danger that a discourse on the subject of this editorial may bring to it that which its sponsors no doubt desire, viz., sufficient publicity to make of it a matter that must command the attention of the great body that is assembling at Washington for the discussion of international affairs. While sensible to this possibility, sight is not lost of the fact that to waive the matter as inconsequential might be taken to mean a mute acquiescence, influencing a concourse of judges to a settlement totally undesirable. And there is no question but that the document printed in the *Peking Leader* as received from the Washington conference China aid association, in which is set forth what is claimed to be the agenda of China at the Pacific conference, is deserving of condemnation. It is the purpose of this article to make it clear beyond doubt that the average foreigner in China, the man who has given any thought to the matter at all, does not countenance any proposal to remove such privileges as he at present enjoys under the laws of extraterritoriality, not because he would wish to partake of rights unfairly obtained, but for the reason that to place himself under Chinese jurisdiction until such time when the Chinese may properly administer justice would be tantamount to suicide. The danger of giving undue publicity to this matter is therefore accepted, the danger of ignoring it being the greater. With the main items of this proposed agenda there is no need here to discuss for the Pacific conference may safely be left with matters which, because of their international nature, are already matters of intelligent consideration, but there are three items which demand very succinct and immediate attention. They are :

(1) That the garrisons of foreign countries stationed along the railway line between Peking and Shanhaikuan be withdrawn.
(2) That the garrisons in the legation quarters at Peking be withdrawn.
(3) That the foreign concessions in China be restored and opened, through her own initiative, to foreign commerce.

To point the finger of scorn and ridicule at nearly all Chinese initiative does not require excessive effort, and, in doing so, it may safely be stated that the desire to hurt is never present, for there is no foreigner in China who thinks at all, and has any real feeling for the country and its people, who is not fully cognizant of their greatness in many aspects of existence. If, therefore, China's icnompetence is now emphasized, let it be understood that the fact creates the necessity, more especially when this incompetence desires to endanger the real welfare of international trade in the country.

The forces of lawlessness and disorder in China, so prevalent as a result of indiscriminate militarism endorsed and encouraged by the handful that guides and controls the country, compel the garrisoning of the railway between Peking and Shanhaikuan. This is very generally conceded when the terrible experience of 1900 is remembered. And the maintenance of garrisons in the legation quarter of Peking is similarly necessitated. Experiments have proved that Chinese can be trained into first-class policemen and soldiers, disciplined beyond the possibility of criminal excesses, provided food and proper care are accorded. It is not to be wondered at that looting is perpetrated when food, and wages cannot be obtained in any other way. With leaders whose concern is centred neither on country nor people, whose greed permits the wildest type of looting so that unpaid soldiery may remain satisfied and subservient, it is no wonder that discipline in China is of the type at the present time that no self-respecting foreigner can possibly submit to, and this is what our unthinking friends who have framed this agenda for the Pacific conference would have us do. Let the leadership of the country first of all place itself beyond the pale of suspicion as to intent and purpose, then produce a force which will guarantee full protection to the lives of all foreigners and their property, instal a ministry of justice that will dispense law faithfully and sincerely, and nearly every foreigner in China will welcome the abolition of extraterritoriality. China may safely be assured that foreigners do not oppose it at the present time through mere whim or prejudice. Her many well-wishers look forward to the time when her strength and competence will warrant a reversal of present relations but it is plainly evident that the time is not ripe, and while the hope that a change may transpire in this relationship in the near future, there is no indication whatsoever that effort other than selfish will make a transference possible for many years to come. Of course there are patriots in China, and it is pleasing to note a steady increase of them, but until their patriotism courts real sacrifice and not the furnace warmed eloquence that emanates from the safety of the treaty ports, there will be very little headway made in the direction most desired.

This leads to the third item mooted for discussion, viz, that the foreign concessions in China be restored and opened, through her own initiative, to foreign commerce. This is rather a tall order, as our friend the grocer would say, with, perhaps, a pleasantry overshadowing his features that must unfortunately be absent in the present instance.

With such strength behind her as would have made the advent of the foreigner and his influence impossible, even unto the present day, it cannot be questioned but that the magnificence of the imperial reign would have held sway over a country still absolutely agrarian, perhaps to China's benefit, although there can be no change where there is no effort, and it is believed that change stands for progress. But modern warships and artillery have prevailed, and now the spread of the foreigner's industrialism seems to be a foregone conclusion. That being so, and if China is to ultimately benefit as a result, it must be acknowledged that what has been built up as a direct result of his not altogether selfish effort, should remain the property of the foreigner. When the time comes that a China is established as will be able to properly conduct her relations with the foreigner on her shores, then it is not likely that the foreigner will make much protest if China wishes to take over her rights of administration and public property, provided, of course, that compensation which allows for loss of goodwill is adequate and fair. But as it stands at present why and for what purpose should these be handed over ? Such disorganization and questionable business practice would prevail as to guarantee bankruptcy of the ports within a very short space of time. Five thousand years of Chinese civilization cannot be upset so completely as to enable modernism a safe and progressive journey under Chinese guidance. It will take years of steady inculcation before the underlying principles of foreign business have been imbibed to the extent that will permit of safe and progressive Chinese control. This does not imply that the Chinese are slower to grasp at modernism than their neighbors the Japanese. On the contrary the Chinese possess an individual intelligence and shrewdness which perhaps excel those of the Japanese. Their one great failing is lack of cohesion, the joining of wit and wealth for the preservation of the state and its improvement. Did they possess this, and did they lose that shrewdness which borders closely on what, to the foreign mind, is technically illegal, they could be left with the reins of treaty port control in perfect safety. When there is conclusive evidence that both these factors have become a part of their make up there can be no just cause why China should not take over her own control as Japan did when extraterritoriality was dispensed with in that country.

The only possible good that can come of present time Chinese agitation for the elimination of extraterritoriality and all that stands for is that the task will be made easier when the proper time comes and for this reason only can the present attempt receive any support at all. To take it for what it is worth in this respect can have no harmful effect, but to accept the effort in any other light is to court disaster.

* * *

Japanese Engineers in England

THE city planning commission of Japan headed by Mr. H. Yamada with Mr. H. Shimizu and Mr. N. Iwata, both engineers of the municipality of Osaka, are now making a careful study of scientific development in municipal engineering in England and enjoying the rather unique opportunity of carrying out their researches under the personal guidance of the best British known experts, says the *Sanitary Record*, Japan is in the throes of development from an agricultural to an industrial country. The light transport of rickshaw and handcart is being rapidly replaced by motor cars and heavy traffic, which necessitate properly constructed, hard-wearing roads. In addition to this development the country is suffering from a housing shortage similar to that experienced in England. With the thoroughness so common to the Japanese, these gentlemen are investigating every phase of city and town development, viz., underground railways, roads, housing, sewage, disposal of refuse, etc. They have seen the whole of the working of the underground railways of the city of London, and from that proceeded to the details of the special construction of roads in the city, illustrating the uses of asphalt, wood paving, and other special surfaces necessitated by the extraordinary weight of traffic to be dealt with. Thanks to the interest shown by English borough and highway engineers, they have been afforded an opportunity of closely studying the latest methods adopted in regard to sewage and refuse disposal. Much interest was shown in the Hornsey plant, where Mr. Lovegrove, the borough engineer, has brought the art of utilizing waste products to an extraordinarily high standard. During their visit many miles of country roads were covered, and in these investigations they were accompanied by Mr. Pitts, of Messrs. Aveling and Porter, Limited, the well-known Rochester firm, whose connection with the machinery and plant for roads has extended over a very great number of years, and thus secured close technical advice which should prove of considerable benefit in the selection of schemes eventually adopted by Japan. The Japanese delegates will proceed to the cities of Glasgow, Edinburgh, Manchester, Leeds, Liverpool and Birmingham. At the latter city, Messrs. Lever Bros. will afford them an opportunity of visiting the model town which that firm has erected at Port Sunlight.

* * *

Japan Retires Own Obligations

ONE of the most notable features of the bond market in Europe and New York has been the steady, quiet purchasing of Japanese securities for the account of the Japanese government. Nearly $32,000,000 (gold) par value of Japanese sterling obligations have been retired since January first at a substantial profit to the Japanese government, owing to the fact that sterling exchange has been depreciated to a level where the Japanese could buy a pound sterling with Y.7½, compared with Y.9¾ at par. Japan issued the bonds fifteen years ago at par and is now buying them not only at a depreciated exchange price but at a low market value. The total purchases aggregate £6,352,140, of which £2,739,000 are of the 4½ per cent. issue, and £3,613,140 of the same bonds of the second series, leaving £18,420,879 of the first series outstanding, and £19,903,940 of the second series. The original amount of each series issued was £30,000,000 marketed in London, New York, Berlin, Frankfort-on-the-Main and Hamburg in 1905.

The 4½ per cent. bonds are secured by the tobacco monopoly, the revenues from which over a long period have been from $30,000,000 to $40,000,000 annually. The first series bonds are a first charge upon this monopoly and the second series bonds are junior in lien.

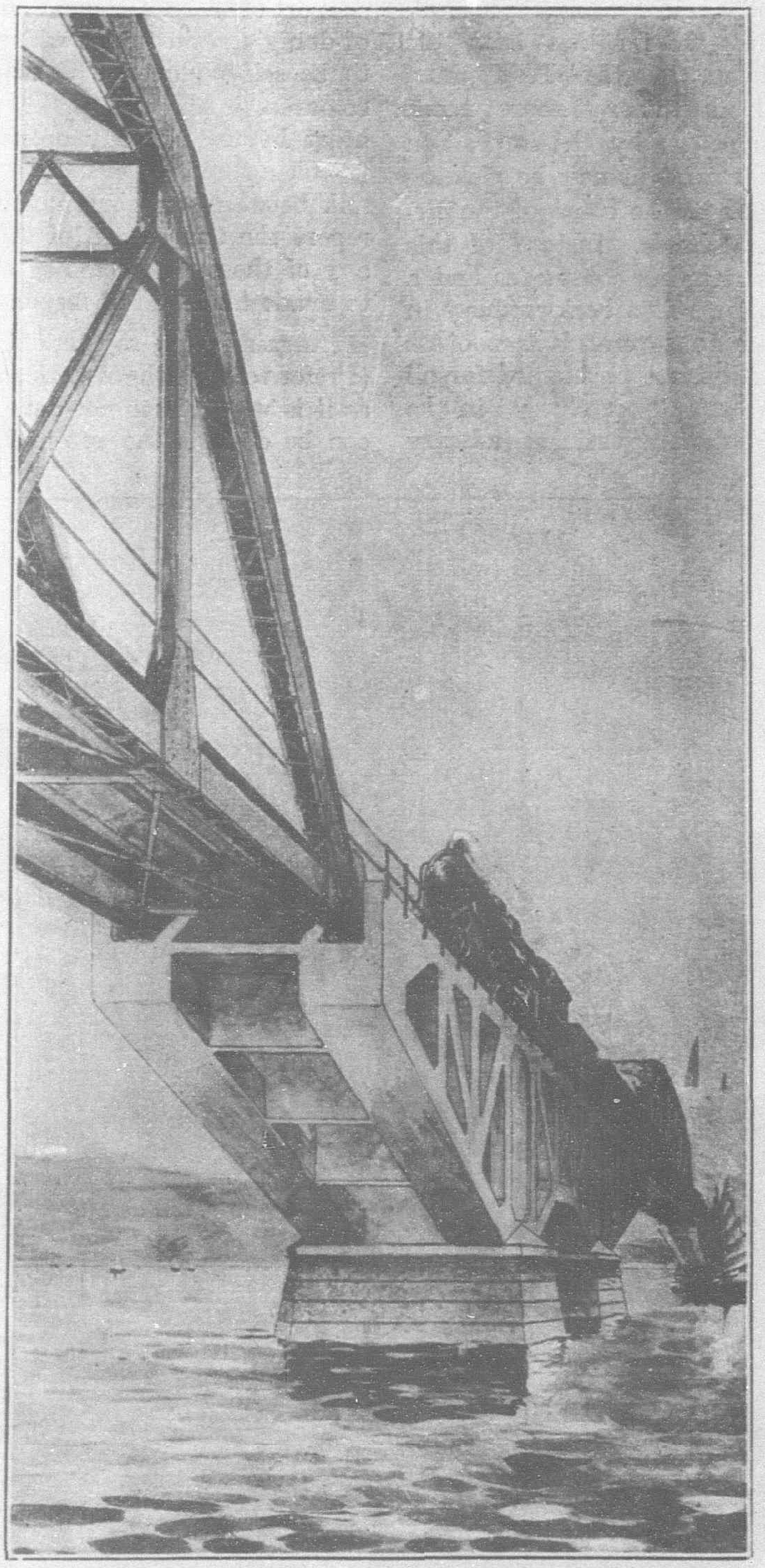
Both series have had a remarkable advance since January 1 on the New York Stock Exchange.

When Japan joined the allies in the war against Germany payment of interest to citizens in Germany was stopped. However, such coupons were redeemed when smuggled out of Germany and brought to the New York branch of the Yokohama Specie Bank. Ltd., regardless as to whether the coupons bore the German stamp. There is a clause in every bond protecting the rights of citizens of every country who hold the bonds in the event of war with Japan.

Reinforced Concrete Railway Bridges

THE Yellow River bridge competition, amongst other things, has contributed greatly to a more intelligent understanding of Chinese engineering problems by advancing ideas from all schools and providing material for discussion for some time to come. Perhaps one of the most interesting phases of the competition was the entrance into the Chinese bridge-building field of the reinforced concrete engineer with his radical ideas overturning recognized standards and creating new precedents in all countries. Numerous reinforced concrete railway bridges have been erected in all other parts of the world except China. In this number of THE FAR EASTERN REVIEW will be found the illustrations and descriptions of several such structures erected by the Netherlands East-Indies States Railways at important points on their Java lines. In Indo-China are found many examples of the best work of the reinforced concrete engineer, from railway and road bridges to buildings, piers, markets, warehouses, etc. It was natural that the reinforced concrete engineer should make his presence felt in such an important competition as that of the Yellow River bridge, and it was also natural that the firm responsible for the most audacious reinforced concrete construction in Indo-China would be prominent in this competition.

We were not surprised therefore to learn that the French firm, "Etablissements Brossard Mopin," who have been so successful in Indo-China and the Straits Settlements had entered the Yellow River bridge competition submitting two designs for cantilever reinforced concrete piers supporting the steel superstructure, and, in addition, three designs with reinforced concrete superstructure for the north end of the bridge where the river is practically always dry. This, for the purpose of cutting down the construction and maintenance expense of an all steel structure.



Design of Cantilver Reinforced Concrete Piers Supporting the steel Superstructure, Submitted in the Yellow River Bridge Competition, by the French engineering firm of Etablissements Brossard-Moppin (Bridge Engineer, Mr. Stanislas Kozierski)

Notwithstanding that the French engineer's estimates and calculations proved that this type of bridge was not only practical, but economical, the majority of the bridge commission ruled that such a novelty as reinforced concrete superstructure and cantilever piers cannot be applied for a railway bridge of such importance as the one over the Yellow River. The French engineers, however, hold to the contention that the adoption of reinforced concrete superstructure for the northern part of the bridge, over a river bed practically always dry, thus permitting erection without the risks attached to false-work, would materially lower the costs and at the same time realize a step forward in scientific bridge building in China. They also argued that the cost of steel work being very high, the economics of bridge building called for the adoption of solutions that would relieve China as far as possible from the high cost of imported steel and encourage the domestic Portland cement industry.

The enterprising reinforced concrete engineers had to rest content with the award of the prize of $25,000 for the third best design submitted. The Brossard-Mopin firm submitted six designs drafted in their Tientsin office after careful study of local conditions on the site of the proposed new bridge and thorough examination of the existing bridge. The general and detailed calculations and drawings were prepared by the firm's experts, and an arrangement was made with the United States Steel Products Company for furnishing the steel work for the 250-foot spans selected as most economical for designs No. 1 and No. 2 submitted by the French firm. The United States Steel Products Company furnished the calculations and drawings for the 250-foot spans, but all detailed drawings and calculations for foundations and piers and for general design of the whole bridge, including also the detailed and general calculations for steel work of Design No. 3 and for the reinforced concrete spans, were prepared solely by Mr. S. Kozierski, the bridge engineer of Etablissements Brossard-Mopin In an article on the bridge tenders published in the August number of THE FAR EASTERN REVIEW, it was mentioned that the French firm was acting for the United States Steel Products Company in the competition The above explanation will rectify this error.

In Mr. Stanislas Kozierski, the Brossard-Mopin firm have secured the services of an engineer who was assistant to Mr. M. J. Ciszewski, chief engineer of the Volga-Bougoulma Railway, and designer of the great 2,561 metre bridge at Simbirsk over the Volga, which was completed in 1916 at the height of the war, undoubtedly one of the great bridges of the world.

Bucyrus Opens Branch in England

The Bucyrus Company, excavating and mining machinery makers, headquarters at South Milwaukee, Wisc., U.S.A., and formerly represented in the British Isles by Messrs. G. F. West & Co., wish to announce that they have now opened their own office at 19 Iddlesleigh House, Caxton Street, Westminster, and henceforth all communications for them should be so addressed.

Gold in the Philippines

By *WARREN D. SMITH*

Acting Chief, Division of Mines, Bureau of Science, Manila

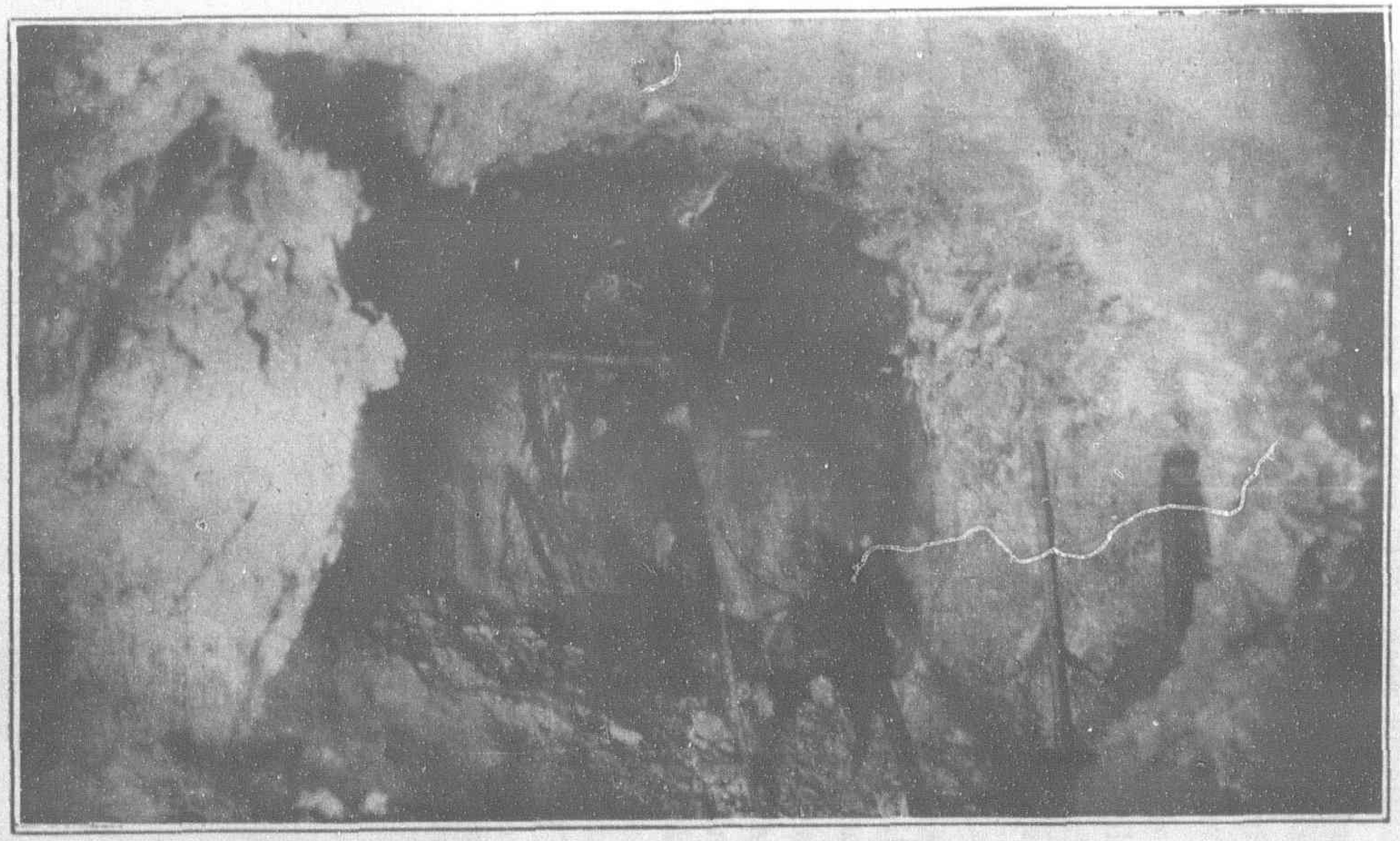
OF the three basic industries—mining, agriculture and forestry—the tripod directly supporting our material civilization and indirectly our whole physical, intellectual, and moral life—the first has been the most tardy in development in the Philippines. This is unfortunate, for, had it received greater encouragement and not, in some instances, discouragement by the imposition of restrictive laws and taxes, the industry might now be yielding a larger revenue to the government and be the cause of the circulation of more fluid capital in the islands. Instead of this prosperous condition, we find a few struggling companies and a host of others which have died still-born. This backwardness in Philippine mineral development is due to several factors other than those named and the government cannot be blamed for all of it. It making what seems to be rather direct charges in the matter of the government's failure to support the mining industry to the fullest extent, I wish to say that this cannot be attributed to a lack of desire to assist so much as to other claims upon the support of the government and to the failure to realize the necessity of doing certain things which, to experienced mining men, appear to be self-evident. The department of agriculture and natural resources is showing that it has the welfare of the industry at heart by the recently proposed very liberal amendments to the petroleum regulations. As the writer is the main connecting link between the government and the industry, it is his duty to report the true status of the situation without reservations. In any of these shortcomings of the government, he does not wish to evade his share of responsiblity.

Again let me say that it is not so much what the government (I refer to both the American and Filipino governments) has done as it is what it has not done which counts. An example of what can be done is the recent bonus offered by the government of

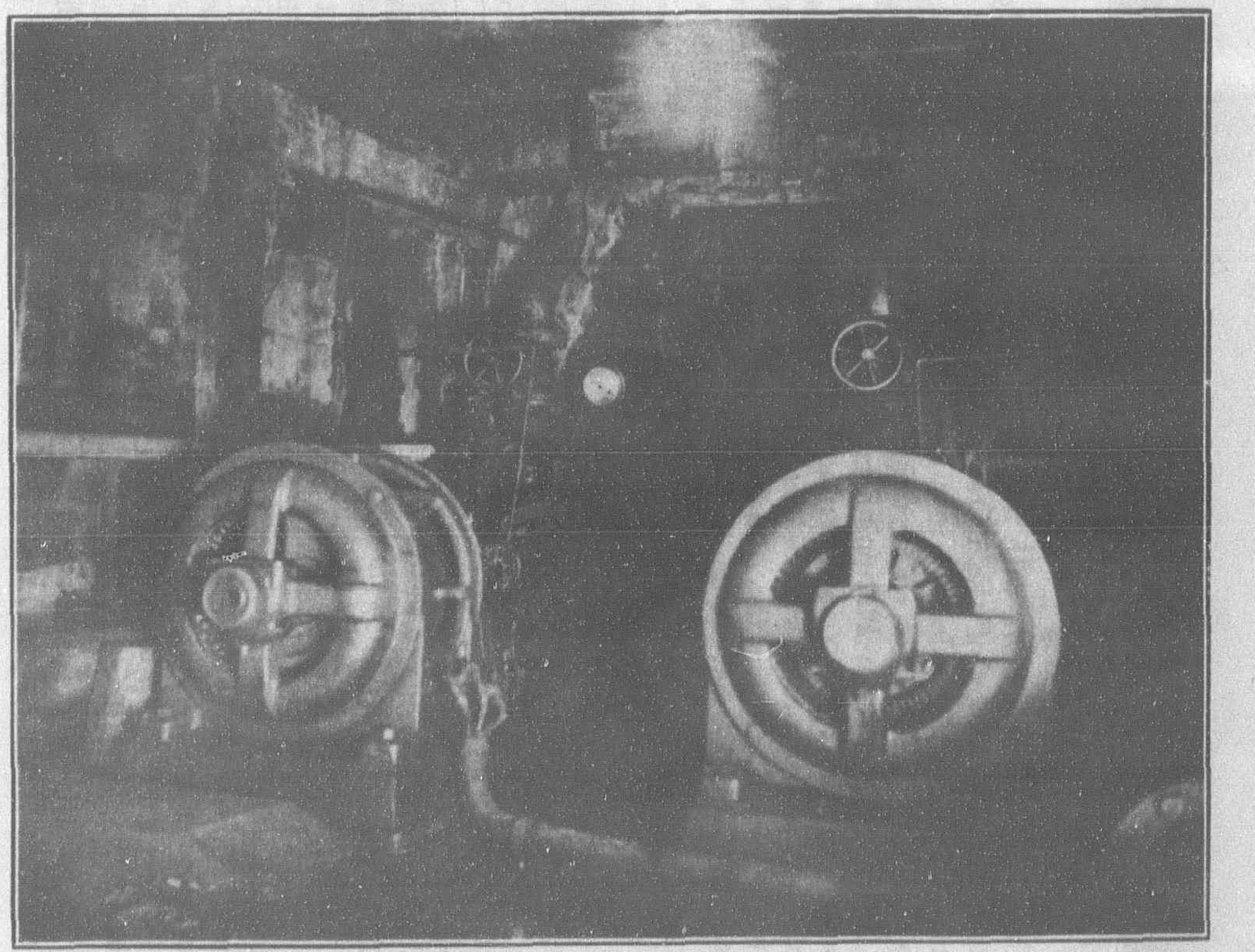
General View of the Plant and Cottages of the Benguet Consolidated Mining Company at Autamok, 5 miles from Baguio, the Philippine Summer Capital

BENGUET CONSOLIDATED GOLD MINES, P.I.

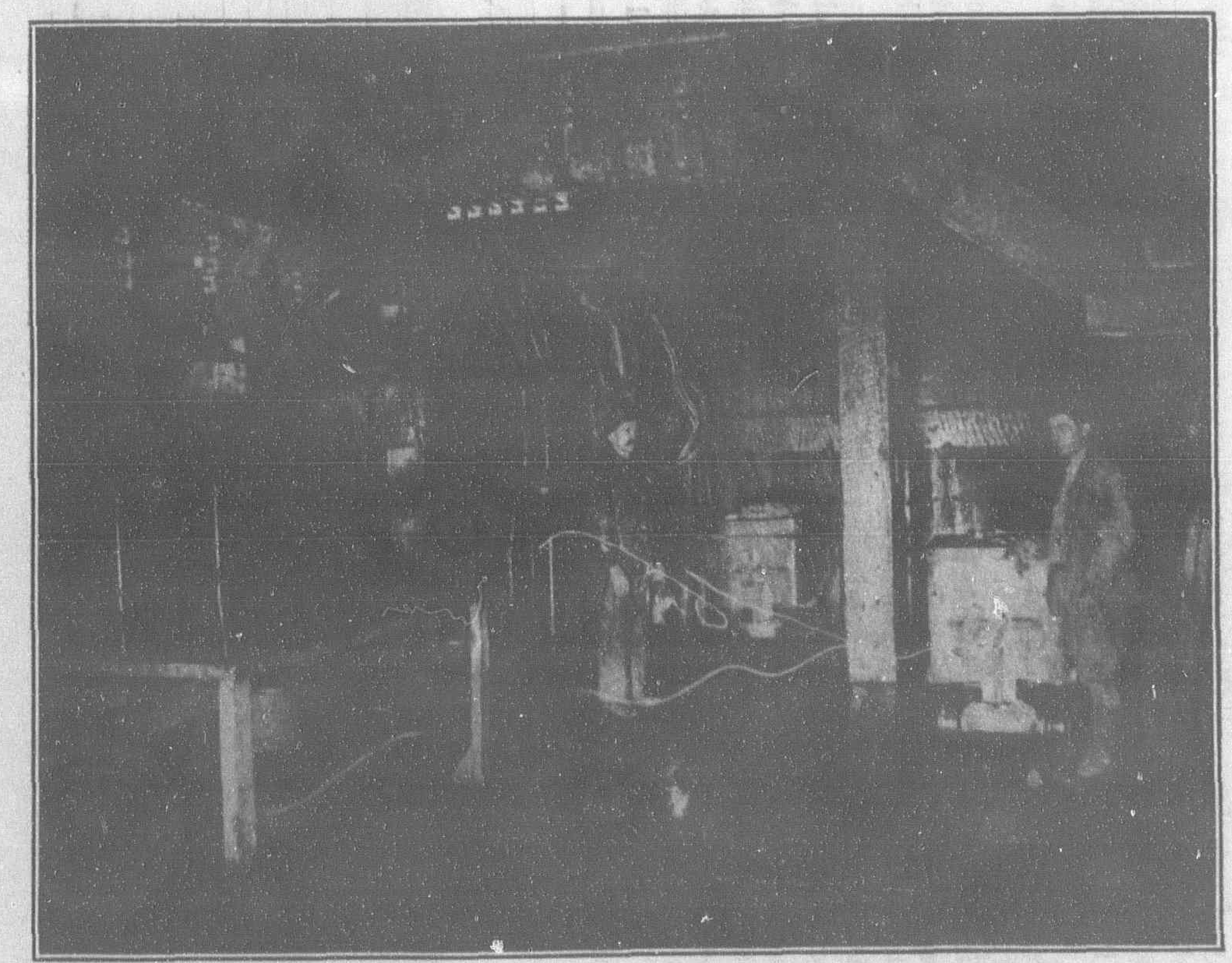
Hand Drilling Crew at Drift Face



Setting up Air Drill in Drift Face



Three Stage Station Pumps on Level "C,"



Shaft Station at Level "C." Car of ore on Cage Ready to be Hoisted (at left)

Australia, of P.100,000 to the persons who first produce a commercial supply of petroleum in that country.

Or let us take a specific case here. The gold mining industry of Benguet depends absolutely upon cheap power—water. The large power project on the Agno River contemplated by the government should be pushed, to make possible the consolidation and successful working of a half-dozen or more low-grade properties now lying idle. Because this is not being done, the government is losing a by no means inconsiderable direct revenue, and the country is losing indirectly by reason of the fact that this potential wealth is not being made available.

American capital, with good reason, has for a number of years been chary about going outside the United States to seek investment, so that the industry here has depended and must still, to a large extent, fall back upon New Zealand, Australian and China coast capital. Our dredging industry has been largely in the hands of New Zealanders ever since it started.

There are indications that the Filipinos are becoming aware of their long neglect of the mineral industry and the number of Filipino prospectors coming in with finds is continually increasing. Although quite a number of them are engaged in coal, gold and iron mining in a small crude way in a few localities, there is no private company of Filipinos engaged in the business on a large scale. It is true that the Philippine government, the majority of whose responsible officials are Filipinos, is now sponsoring several national mining projects whose success cannot be predicted owing to very serious difficulties of a fundamental nature. These have not yet gotten beyond the development stage.

It has been said many times that mining in the Philippines is not a "poor man's game." This is quite true except in gold mining, in which it is possible to make "better than wages" with a very limited capital. In addition to the few Americans engaged in this sort of mining, hundreds of natives get a livelihood by panning the streams. Aside from the great inherent difficulties attending all large industrial enterprises in the tropics, most of the metalliferous deposits are of low grade and refractory. There are exceptions, of course, such as the rich gold placers of the Paracale district, which are now almost exhausted, and the lode being worked by the Benguet Consolidated Mining Company.

The Philippine mineral products in the order of their money value production are : (1) gold ; (2) salt ; (3) stone ; (4) coal ; (5) sand and gravel ; (6) lime ; (7) clay (pottery) ; (8) clay (brick and tile) ; (9) iron ore ; (10) mineral waters ; (11) bituminous rock ; (12) silver ; (13) sulphur.

In the order of their importance in every day life, the list should read about like this : (1) salt ; (2) coal ; (3) iron ; (4) gold ; (5) clay ; (6) stone ; (7) sand and gravel ; (8) lime ; (9) sulphur ; (10) bituminous rock ; (11) mineral waters ; (12) silver.

It will be noticed that gold, which comes first in the list of money-value production, is placed fourth in the second list. The reason for this is that gold has little direct industrial use and only an arbitrary and artificial value as money.

Nevertheless, considering the use of gold as a basis for money practically throughout the world, and its universal appeal to mankind as treasure, it plays a tremendous role in our economic system, so that a country to-day finds it imperative to have a gold supply.

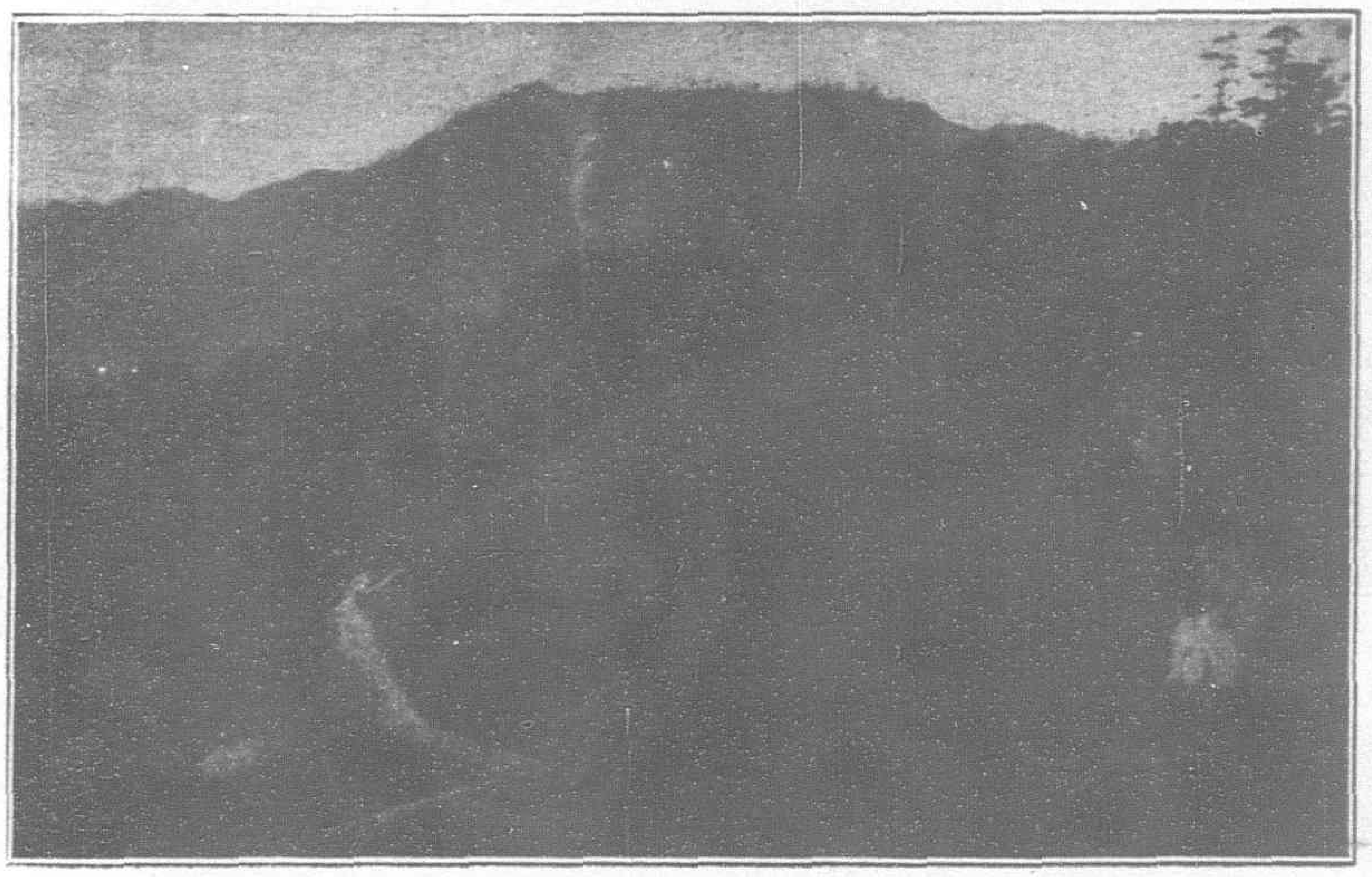
The gold production is still the highest of all the mineral products and the industry remains almost entirely in the hands of Americans with some assistance from Australians and New Zealanders, who are first cousins to Americans in the mining business.

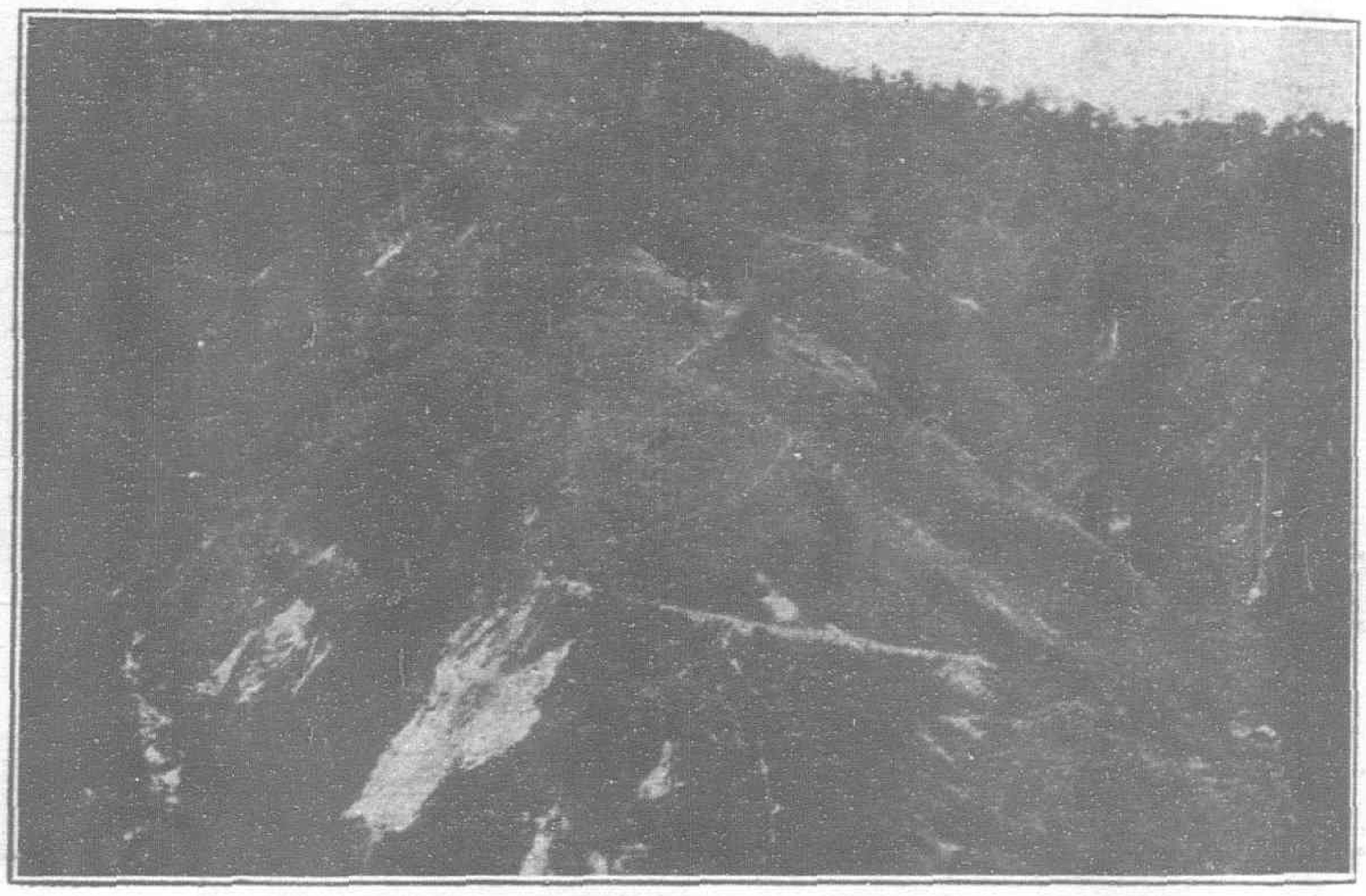
It is noteworthy that, inasmuch as in other countries the gold mining business has fallen off greatly, the Philippines have maintained a steady, though not large, output of the yellow metal, only a few ounces less in value than the banner year of 1916, when the purchasing power of gold was more than it is now.

The Aroroy district still leads the others in gold production owing to the continuous operation of its two mines, the Colorado and the Syndicate. Benguet, with its single large producer, alone almost equalling the combined production of the two above-named in the Aroroy district, is a close second. Paracale, whose rather remarkable, though small, dredging field once brought it forward into the limelight, is to-day a mere reminiscence of its former self—only one dredge and a small ten-stamp mill operating.

The Benguet Consolidated, in Antamok Valley, has, during the past few years when many gold mines in other parts of the world have had to close down owing to the low value of gold, steadily paid dividends of from 25 to 35 per cent. At the present writing, the values on the lowest level of the mine are most encouraging, indicating possibly secondary enrichment in the vein. This mine is fast coming to be recognized as one of the notable small gold mines of the world. The vein is a quartz (and some calcite) filling in a fault-brecciated zone nearly 200 feet wide between andesite walls, with two strong veins, one on the hanging, the other on the foot wall with low grade mineralized "country" between. The mineralization in this lode is undoubtedly connected with the quartz-diorite intrusive mass, a short distance to the east. It is noteworthy that the successful producers all around the Pacific including Korea, Alaska and California are generally associated with a rock very similar to this. Gold deposits in the later andesite are neither so rich nor so persistent. A study of the geology of

WHERE GOLD IS FOUND IN THE PHILIPPINES


The Baguio Region


The "Magma" Property in the Gold Region of Baguio

these deposits years ago indicated what might be expected of them, and early predictions by the government geologists at that time have been fully substantiated.

The gold produced from Philippine mines during 1920 amounted to approximately P.2,500,000 ; of this the Consolidated turned out P.1,068,892.30.

* * * *

The Benguet Consolidated Mining Company

The latest official report on the properties of this concern organized in 1903 under the laws of the Philippine Islands gives its present capital at P.700,000, Philippine currency, divided into one million shares of a par value of seventy centavos each. The original capital was $1,000,000, U. S. currency, but this was reduced in 1916 to P.1,000,000, Philippine currency, and in 1921 to the present amount.

The company owns approximately 420 acres of mineral bearing land, of which 285 acres are held under patent, and 135 acres under location. About 8,000 feet along the strike of the main Benguet lode are included within the holdings of the company.

Since 1915, when the company was reorganized, it has produced gold and silver bullion of a total value of P.4,744,000, Philippine currency, and paid dividends amounting to P.1,400,000. Regular quarterly distributions of five centavos per share are made on March 31st, June 30th, September 30th and December 20th, of each year, and two extra distributions of like amounts are made in January and August. Dividends to shareholders out of the Philippines are paid in San Francisco gold checks at two pesos, Philippine currency, for one dollar, U. S. currency.

Notwithstanding the substantial dividends paid, the strength of the company has been steadily built up until it now has assets consisting of cash, supplies, buildings and machinery, etc., worth more than P.1,000,000, and ore reserves amounting to more than P.4,500,000. This ore estimate does not count ore below Level "C," which is now opened up on top for a distance of more than 830 feet on the hanging wall vein, and more than 400 feet on the foot wall vein. The hanging wall vein on Level "C" for a total distance of 830 feet had an average width of 4.7 feet (four and seven-tenths) and an average value per ton of $40.52, U. S. currency.

The shaft is now at Level "D," which is one hundred feet vertically below Level "C." The crosscut from the shaft to the lode on Level "D" should be in before the end of this year. Geological conditions on Level "C" are such that it is confidently expected the veins on Level "D" will equal those on Level "C" as to size and value.

The ore is a mixture of quartz, iron sulphide, altered diorite and clay, with quartz predominating. Although a very small per cent. of the gold is free, none is visible. The ore treatment consists of crushing, stamping in cyanide solution, grinding to pass 100 mesh in pebble mills, and a nine day cyanide treatment. The pulp is passed through an Oliver filter before final discharge.

Electricity is used for power and lighting. It is furnished by two hydro-electric plants owned by the company and having a combined capacity of 375 K.V.A.

The capacity of the milling and cyaniding plant has been steadily increased from 17,360 tons of ore in 1916 to 35,565 tons in 1920. The production has increased from P.602,500 in 1916 to P.1,068,900 in 1920. During the first seven months of the present year the production amounted to something over P.700,000. Plans are now being considered for increasing the capacity of the plant to 5,000 tons of ore per month, or about 60,000 tons per year.

In writing to a gentleman interested in the "Magma" property, about seven miles south of the Benguet Consolidated Mining Company's field of operations, Mr. Warren D. Smith says, "On the whole from my preliminary examination, I can state that this is a most attractive prospect and I would not hesitate to recommend its serious consideration by persons interested in developing new gold properties. It has this additional recommendation : that it is in the district where the richest gold mine in the Far East is located " The geology of the mine, as described by its mine superintendent, Mr. O. L. Kettenbach, in his last annual report, is as follows :

"The main Consolidated vein is formed by two main fault fissures and a third series of adjustment creeks, formed, I believe, with one exception, contemporaneously with the second of these main fissures.

"In the first two fissures were deposited the main hanging wall and foot wall veins. Of these two the hanging wall vein is by far the older, non-mineralized inclusions being practically absent within it while abundant in the foot wall vein. The fault movements producing both fissures were intense, as is evidenced by the cleanly defined hanging wall of one and foot wall of the other, together with the abundance of clay selvage on both and the intensity of slicken siding which is occasionally seen.

"The advent of the footwall fault in such close proximity to the hanging wall fault created a zone of weakness beginning at the former and extending to the latter. Adjustment cracks and planes always follow major fault movements and I take the numerous cross veins in the mine to have been formed in cracks or secondary fissures caused by these movements.

"These two fault systems are by no means parallel, and the mineralized solutions working along each produced, first, a zone of enriched ore in close proximity to each fault plane, and, secondly penetrated the brecciated mass lying between the two and mineralized it in a ratio varying directly with the distance separating the two fissures.

"The remarkable persistence of values, both laterally and vertically, particularly in the hanging wall fissures, leads one to the belief that the mineralizing solutions were at least fairly deep seated and abundant in their supply."

At present the Company is driving a 3,500-foot drift along the hanging wall of the lead, the entrance to this being in Antamok Cañon to the east of the present workings about 3,500 feet. This is primarily intended for drainage, but it will also be used to thoroughly prospect the lead by means of crosscuts and raises run from it at regular intervals. The old native workings, known as the "Fianza gold mine," are included in the ground to be explored by this drift.

Engineering in Japan

Electricity and shipbuilding to-day are attracting more followers among the youth of Japan than any other forms of employment, according to Mr. Saitaro Oi, of the Nippon Electric Co., of Tokio.

Mr. Oi says that the Japanese universities are paying particular attention to electrical and mechanical engineering. The Imperial University at Tokio and Kioto has more students following these courses than any of its other technical branches. Mr. Oi's father was among the first small electrical engineering group graduated from the university 40 years ago. At that time all of the professors were Occidentals. To-day the entire engineering faculty is composed of Japanese.

When interviewed at the offices of the International Western Electric Co., Mr. Oi called attention to one of the common difficulties that beset prospective telephone subscribers in Japan's rural districts. Before they can get service with the outside world the villagers must find at least 100 of their number who are willing to band together and purchase their own swithboard. Then only can they obtain a wire connection with other localities.—*Engineering World*).

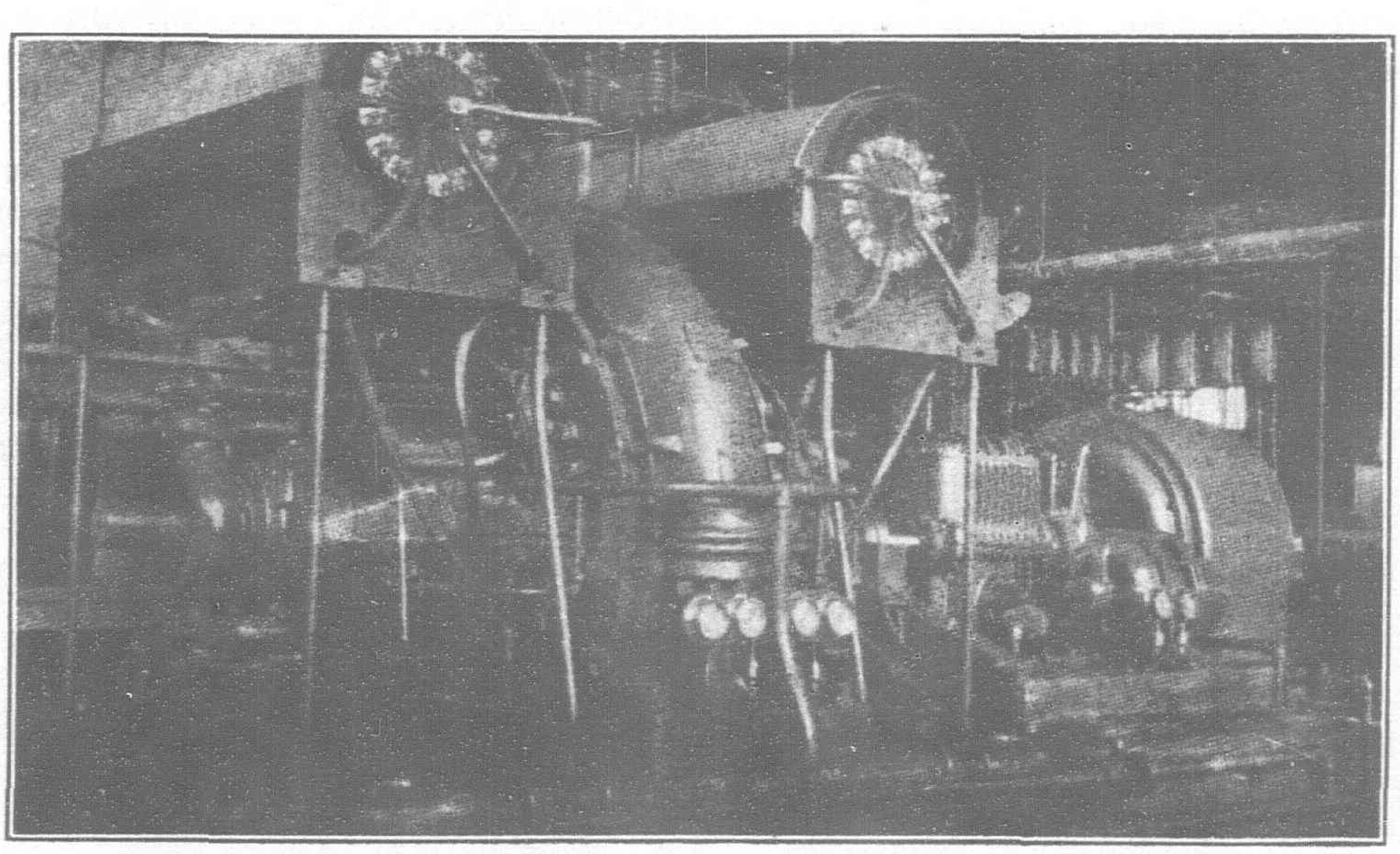
International Radio

By Pierre H. Boucheron of the Radio Corporation of America

RADIO communication is a new international force. It has grown from the laboratory and speculative stage to a most potential factor in the field of international commerce. There is to-day an effective and highly specialized system of long-distance radio communication in actual operation which is gradually spreading its circuits throughout the main traffic centres of the world.

Continent-to-continent radio-telegraph service is now an established business. It forms a valuable supplement to present international communication facilities, and offers an expansion of direct connection with remote sections which, because of geographical features, cannot be conveniently reached by cable or by land line.

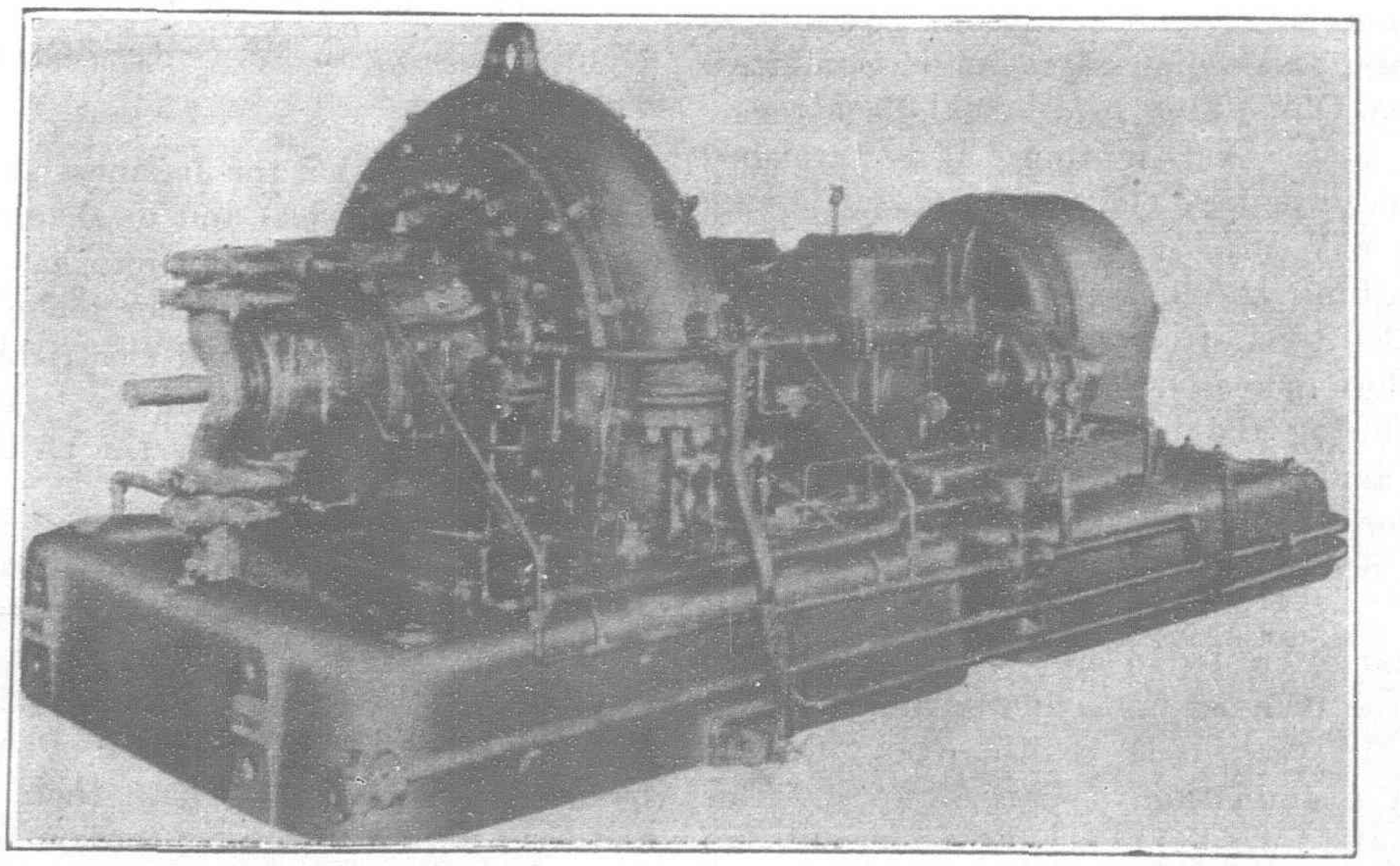
Radio-telegraphy is, of course, the most practical means of ship communication and is particularly adaptable to long-distance trans-oceanic communication. It is, therefore, quite international in character and its present and future commercial importance is indicated by the plans for world-wide wireless now being executed by the Radio Corporation of America. This will eventually place radio communication on substantially the same footing with the international cables and mails.



200-kw. Alexanderson Radio Frequency Alternator Installed at the Radio Corporation's Trans-oceanic Station, New Brunswick, N. J.

The Radio Corporation of America

The Radio Corporation of America is the outcome of an arrangement made in the early part of 1920 whereby the interests of the former Marconi Wireless Telegraph Co. of America and the radio activities of the General Electric Company were merged in one organization. Later, an arrangement was entered into with the American Telephone and Telegraph Co., by which the Radio Corporation acquired the use, in its field, of recent radio inventions of great importance which had been successfully employed in transcontinental telephony. These included radio-telephony at great distances, the transmission of public addresses or words of command by loud-speaking telephone and the multiplex use of one wire.



200-kw. High Frequency Alternator, shown Installed in Illustration above

Furthermore, arrangements have been made with the United Fruit Company, for the refitting of their existing radio stations and for the erection in their territory of additional stations which, when completed, will afford the Radio Corporation of America additional and valuable traffic facilities.

These arrangement have had the result of unlocking the patent field and permitting a more extensive and effective use of radio in its manifold applications.

The Radio Corporation of America is to-day engaged in three general activities, namely: trans-oceanic communication, which entails the handling of international messages to and from the United States and Europe and Japan; marine communication, which supplies ship-to-ship and ship-to-shore radio messages, and general sale of radio apparatus to government, private and commercial interests, as well as to the great amateur field which has assumed marked proportions in recent years.

The New "Radio Central Station"

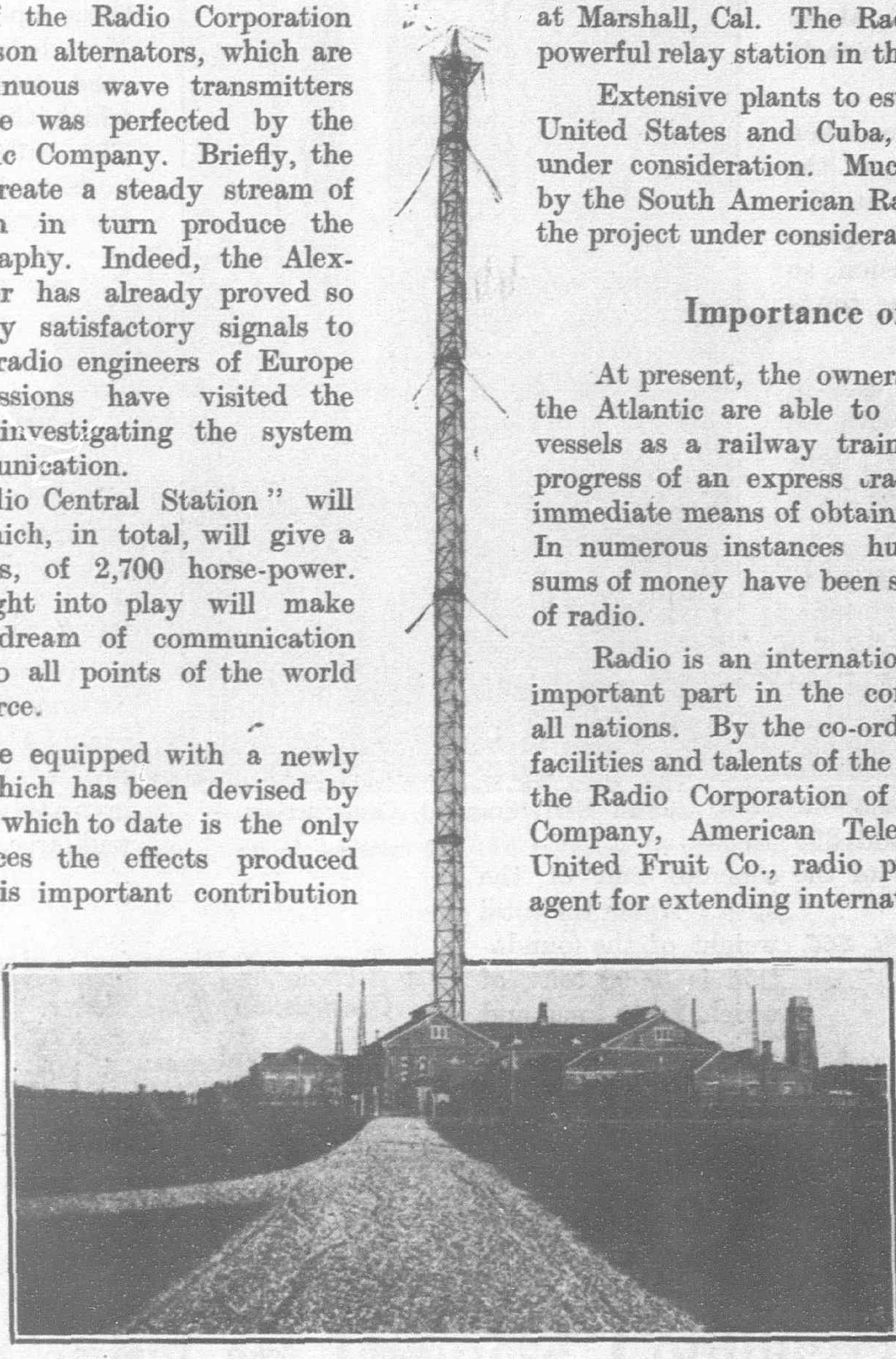
In the general plans of the Radio Corporation of America for world-wide wireless communication, New York city has been chosen as the radio centre. The construction of the "Radio Central Station" which will make this city the focal point of the proposed system of communication, is well under way and one unit was in operation in July of this year. "Radio Central" as it is called, is located at Rocky Point, near Port Jefferson, on Long Island, and is about 50 miles from New York city. This gigantic station will consist of six separate transmitting stations each having a receiving station located nearby, thus affording duplex operation. Each of these six transmitters and receivers will operate simultaneously, thereby permitting the handling of a great amount of traffic. The transmitting station aerials are a mile and a half long, and are being erected in the form of a star about the central power house. The towers which support these aerials are 400 feet high. Each separate unit will, in itself, be equal in transmitting efficiency to the most powerful radio station in operation at present. It will be possible to combine any number of the units for signalling over exceptional distances under circumstances when great power is necessary.

The Alexanderson Alternator

All long-distance stations of the Radio Corporation employ 200 kilowatts. Alexanderson alternators, which are the most highly perfected continuous wave transmitters developed to date. This machine was perfected by the engineers of the General Electric Company. Briefly, the function of the alternator is to create a steady stream of high frequency currents which in turn produce the electric waves of wireless telegraphy. Indeed, the Alexanderson 200 kilowatts alternator has already proved so reliable and has sent such highly satisfactory signals to European stations, that leading radio engineers of Europe and several government commissions have visited the United States with a view of investigating the system and adopting it for national communication.

The installation at the "Radio Central Station" will include ten of these machines which, in total, will give a power output of 2,000 kilowatts, of 2,700 horse-power. The electrical force thus brought into play will make possible the realization of the dream of communication engineers to transmit messages to all points of the world from a single centrally located source.

The receiving stations will be equipped with a newly developed method of reception which has been devised by Radio Corporation engineers, and which to date is the only apparatus that effectively reduces the effects produced by atmospheric disturbances. This important contribution to the radio art will insure uninterrupted reception from other countries.



The Japanese Government Wireless Station at Funabashi, Communicating with the Stations of the Radio Corporation of America in Hawaii and California

Construction of Big Station Under Way

Countless details of great technical interest and engineering importance are incorporated in the specifications for the New York "Radio Central." These have been prepared jointly by the engineering staffs of the Radio Corporation of America and for the General Electric Company giving assurance of perfection in design and detail. The General Electric Company manufactures the necessary apparatus for the "Radio Central Station" as well as for other contemplated links of the world-wide wireless chain, while the construction and operation of the station will be under the direction of the engineering and operating staffs of the Radio Corporation of America.

The present stations of the Radio Corporation on the Atlantic Coast work simultaneously with connecting stations in Great Britain, Norway and Germany and by means of European land lines the radio service extends to Sweden, Denmark, Finland, Poland, Austria, Switzerland, Italy, Spain and Portugal. On the Pacific Coast, the powerful transmitter at Bolinas, Cal., is in constant communication with Japan and Hawaii.

Future International Stations

The Radio Corporation has recently concluded the preliminaries of a contract with the Polish government for the erection of a high-power trans-oceanic station to be located near Warsaw. This station will provide communication between the business interests of Poland and other industrial centres.

The Japanese government, appreciating the value of an international radio service, has erected two high-power stations which are now in service. One Japanese transmitting station is located at Hara-No-Machi near Sendai, and the receiving station at Funabashi. On the American side, the corresponding high-power transmitting station is located at Bolinas, Cal., with the receiving station at Marshall, Cal. The Radio Corporation also maintains a powerful relay station in the Hawaiian Islands.

Extensive plants to establish radio service between the United States and Cuba, Brazil and Argentina are now under consideration. Much of this work will be undertaken by the South American Radio Corporation, which now has the project under consideration.

Importance of Radio to Shipping

At present, the owners or agents of a steamer crossing the Atlantic are able to keep in as close touch with their vessels as a railway train dispatcher is able to note the progress of an express train. Moreover, radio provides an immediate means of obtaining assistance in case of distress. In numerous instances hundreds of lives as well as huge sums of money have been saved through the instrumentality of radio.

Radio is an international force destined to play a most important part in the commercial and social relations of all nations. By the co-ordination of the resources, research facilities and talents of the great institutions associated with the Radio Corporation of America, the General Electric Company, American Telephone and Telegraph Co. and United Fruit Co., radio promises to become the foremost agent for extending international communication.

* * *

The Haranomachi Wireless Station

The Japanese government is rapidly pushing forward its high-powered radio stations in order to receive and send messages across the Pacific in connection with the plants of the Radio Corporation of America. One of the most important of these is the 660-foot reinforced tower station recently erected by the department of communications at Haranomachi, the following description of which appeared recently in *Engineering:—*

1. *The Tower.*—The reinforced concrete tower of the new wireless telegraphy station of Haranomachi, designed for the department of communications by Professors K. Shibata, Y. Nagayama and I. Ksama, of the Tokyo Imperial University, is a hollow cone, with the apex truncated, which rises to the height of 660-ft. (=201.2 m.), or 663.8 *shaku** ; the external base diameter, is 57-ft. 9-in., being to the height in the ratio of 1 : 11. The external diameter at the top is 4-ft. 6-in., or nearly $\frac{1}{13}$ of that of the base. The thickness of the concrete wall varies from 33-in. at the base to 6-in. at the top, the steel rods being embedded in the concrete at the depth of 2½-in. from the outside surface. The composition of the concrete was 1 : 2 : 4 both for the shaft and the foundation. The work of construction was carried on by the Oriental Compressol Company of Tokyo. Table I gives the wall thickness and the median diameter (or the diameter of the cone midway between the internal and external surfaces) for successive $\frac{1}{24}$th parts along the height of the shaft.

The outer and inner surfaces of the tower are not exactly co-apex cones. The height of the centre of gravity is consequently slightly different from that of a solid cone or a pyramid, although the diameter at the top is sufficiently small in comparison with that at the base. The position of the centre of gravity is about 190-ft. above the ground, namely, at an elevation nearly equal to 1/3.5 of the total height.

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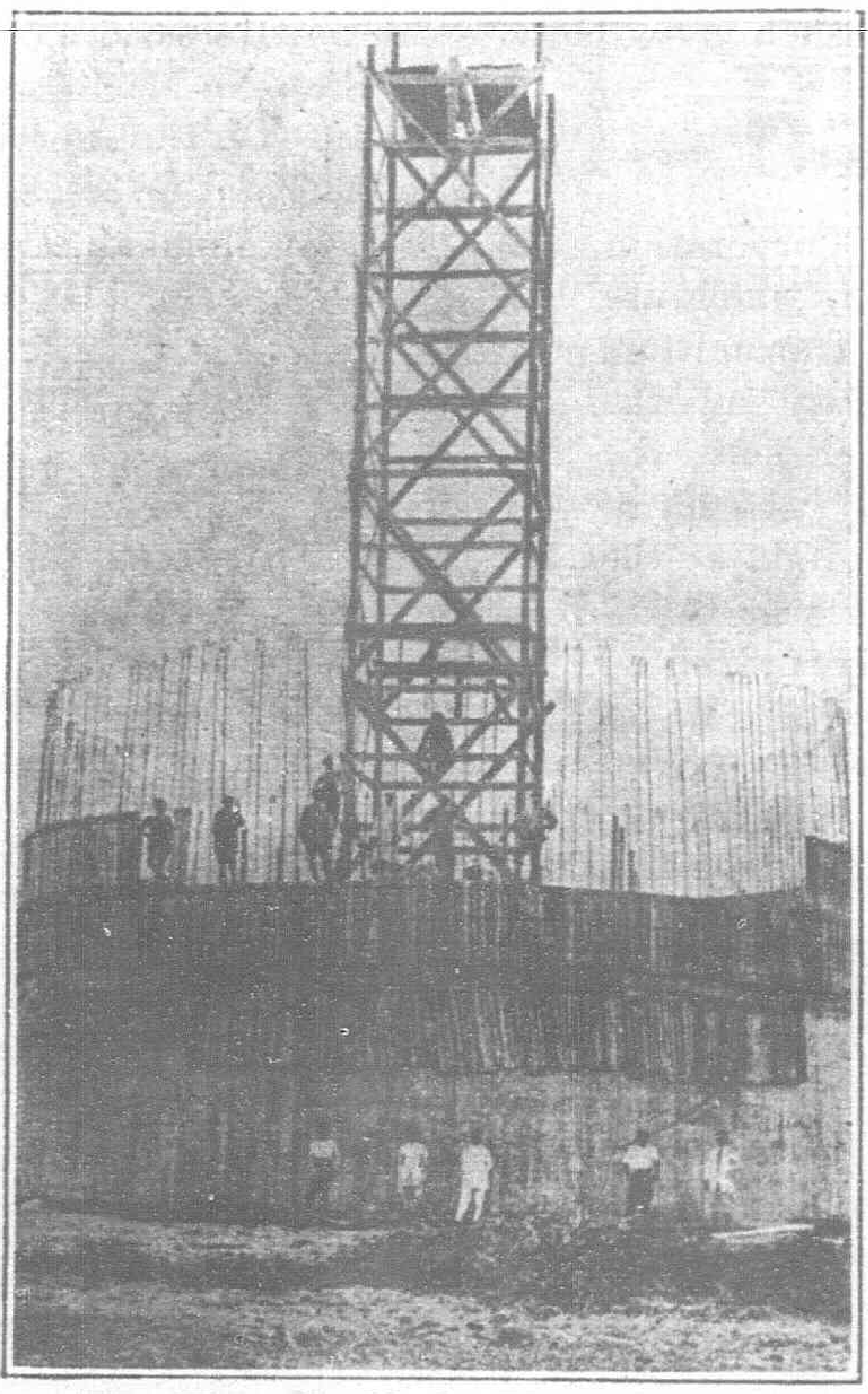
*1 *shaku*, or Japanese foot = 0.99421 English foot.

The maximum wind pressure taken into consideration in the designing of the tower was 60-lb. per square foot at the base with an increment of 1-lb. per square foot for every 10-ft. height ascension, so that the pressure allowed for at the top is 126-lb. per square foot.

The amount of the material used in the construction of the tower with an allowable maximum pressure of 4-2 tons per square foot on the ground, was as given in the following summary :—

	Structure Steel. tons.	Concrete.	Concrete. tons
Foundation	79	225 cub. *tsubo* † =	2,930
Shaft	290	550 cub. *tsubo* † =	7,160
Total ...	369	775 cub. *tsubo* =	10,090



The Hara No Machi Wireless Tower at an Early Stage of Construction

The total weight of the shaft is about 7,450 tons, of which 7,160 tons and 290 tons are respectively the weights of the concrete and of the steel. Again the total weight of the foundation is 3,090 tons, of which 2,930 tons and 79 tons relate respectively to the concrete and the steel. The ratio by weight of the steel to the concrete is 1 : 37 for the foundation and 1 : 25 for the shaft.

Fig.1. ELEVATION & HORIZONTAL SECS.

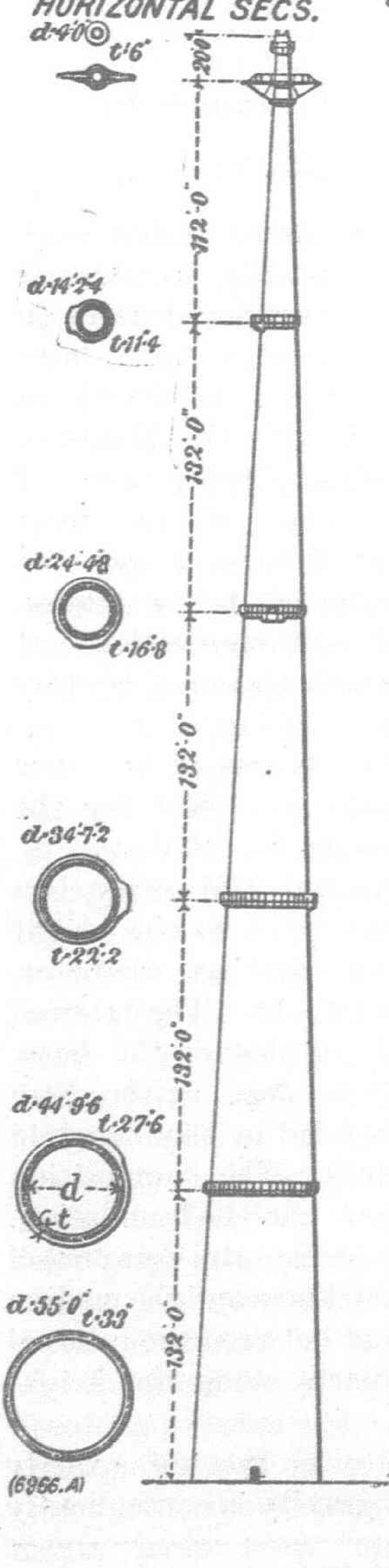
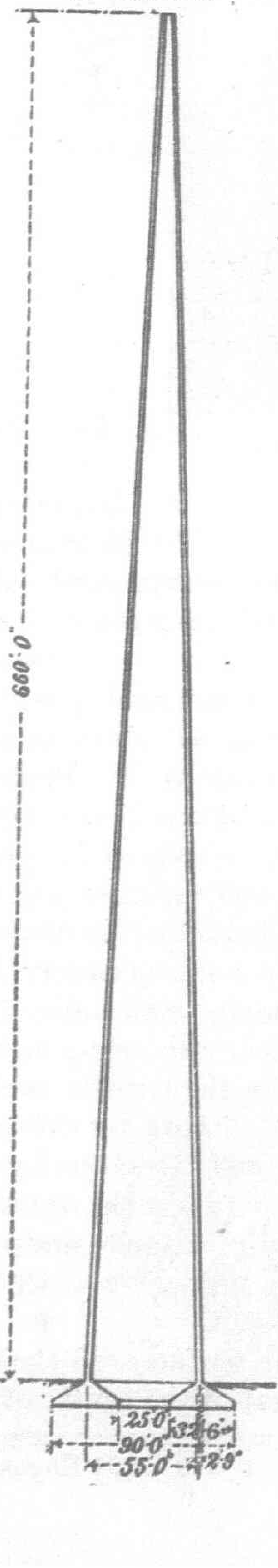


Fig.2. VERTICAL SEC. OF SHAFT.



The work of the foundation construction was started on May 23rd, 1919, and the shaft, built successively in 147 divisions or layers of concrete deposit, each 4-ft. 6-in. in height, has been completed on September 26th, 1920, at 3 p.m. The tower wall has no opening, except one narrow entrance at the base, and four small windows each 2-ft. square, at successive intervals 132-ft. in height.

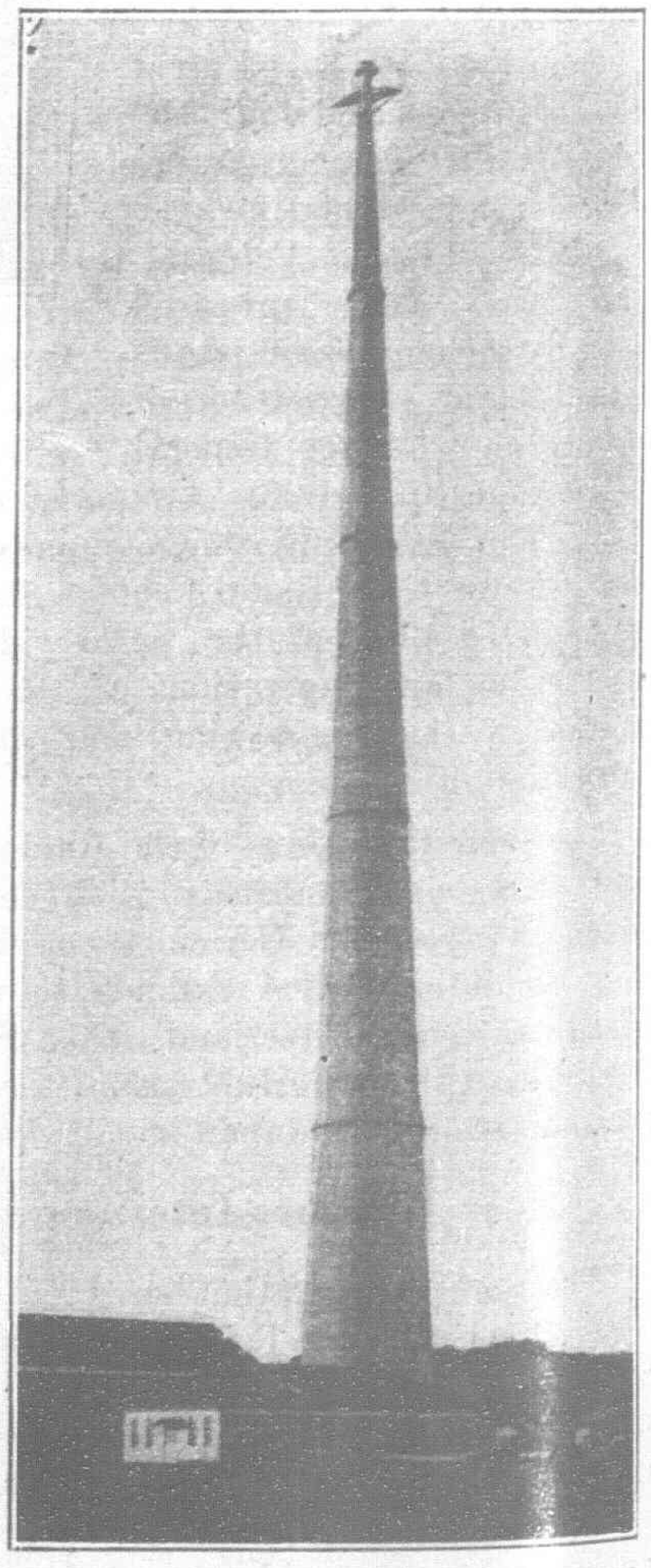
2. *Nature of Soil.*—The tower stands on a narrow alluvial plain about the small River Shinden-gawa, passing between the low tertiary hilly districts. For the surface 4-ft. the soil is composed of black and red earths. Then comes a layer of sand about 4-ft. in thickness, lying upon a layer of clay 2-ft. thick. Next below comes a layer of gravel and sand more than 10-ft. in thickness, on which the foundation of the tower rests. The different formations are arranged horizontally, a circumstance favorable to the erection of a heavy structure.

We have no exact knowledge of the period of the earthquake vibration at Haranomachi, as no seismographic observation has been made there. For the sake of reference, I give in Table II the value of the period of large earthquake vibration measured seismographically at different places where the ground is composed of alluvial soil.

Of the different places here taken into consideration, Hitotsubashi, in the lower portion of Tokyo, is to be regarded as an example of deep and very soft alluvial soil; and the vibration period there is invariably about 1 second, both for small and large earthquake movements.

TABLE I.—*Dimension, and the Amount of Material used in the Construction of the Tower.*

Height. ft. in.	Median Diameter.‡ in.	Thickness of Wall. in.
Base	660.0	33.00
27 6	634.5	31.88
55 0	609.0	30.75
82 6	583.5	29.63
110 0	558.0	28.5
137 6	532.5	27.38
165 0	507.0	26.25
192 6	481.5	25.13
220 0	456.0	24.00
247 6	430.5	22.88
275 0	405.0	21.75
302 6	379.5	20.63
330 0	354.0	19.5
357 6	328.5	18.38
385 0	303.0	17.25
412 6	277.5	16.13
440 0	252.0	15.00
467 6	226 5	13.88
495 0	201.0	12.75
522 6	175.5	11.63
550 0	150.0	10.5
577 6	124.5	9.38
605 0	99.0	8.25
632 6	73.5	7.13
660 0	48.0	6.00



The Hara No Machi Tower Completed

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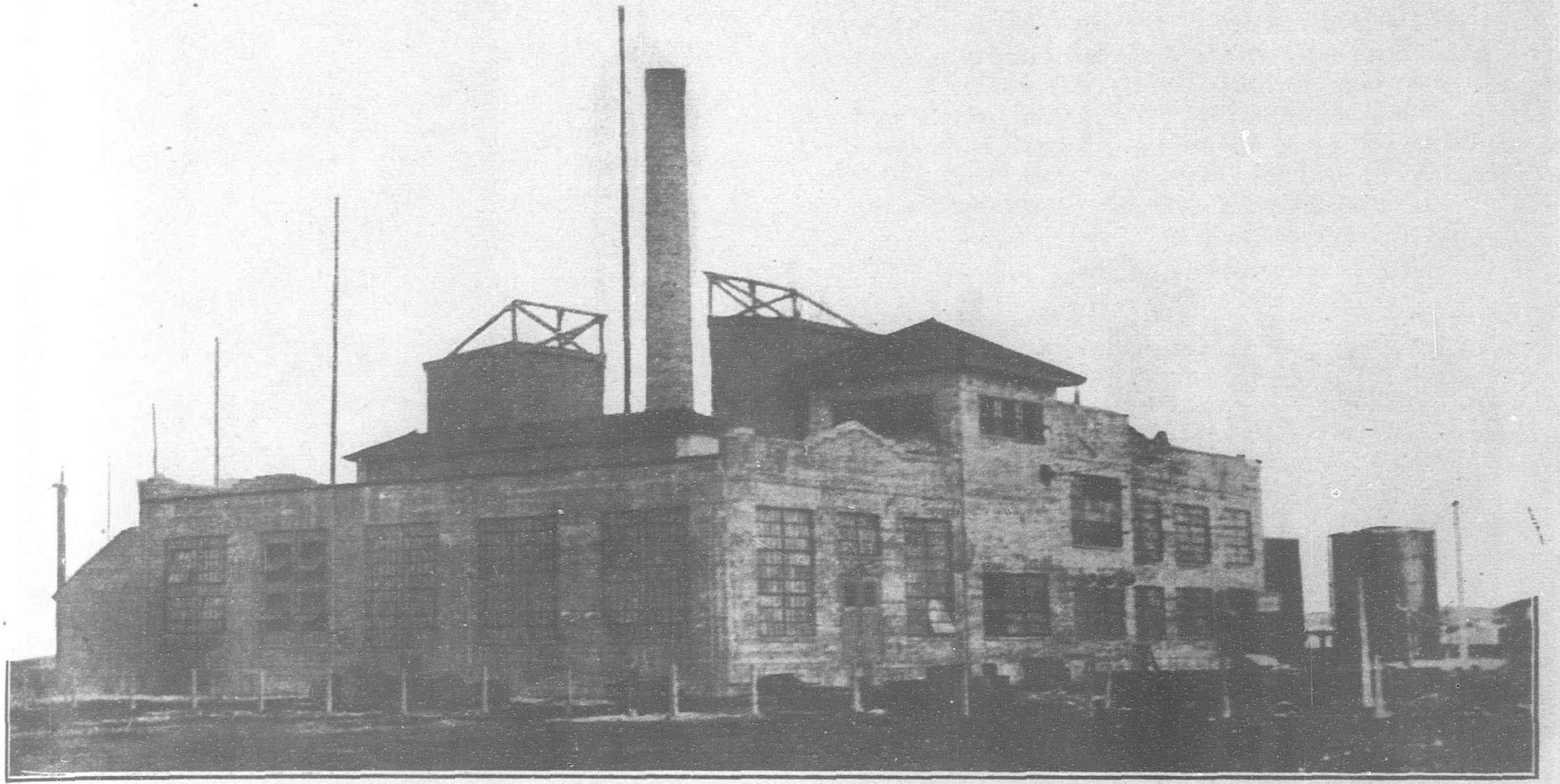
†1 tsubo = 6 *shaku* cube = 216 cub. *shaku* = 212.3 cub. ft.

‡ Diameter from middle to middle of the concrete wall.



Power-house of the Trans-Oceanic Wireless Station at Kahuku, Hawaii, Transmitting Messages Simultaneously to the California Stations of the Radio Corporation of America and the Japanese Government Station at Funabashi

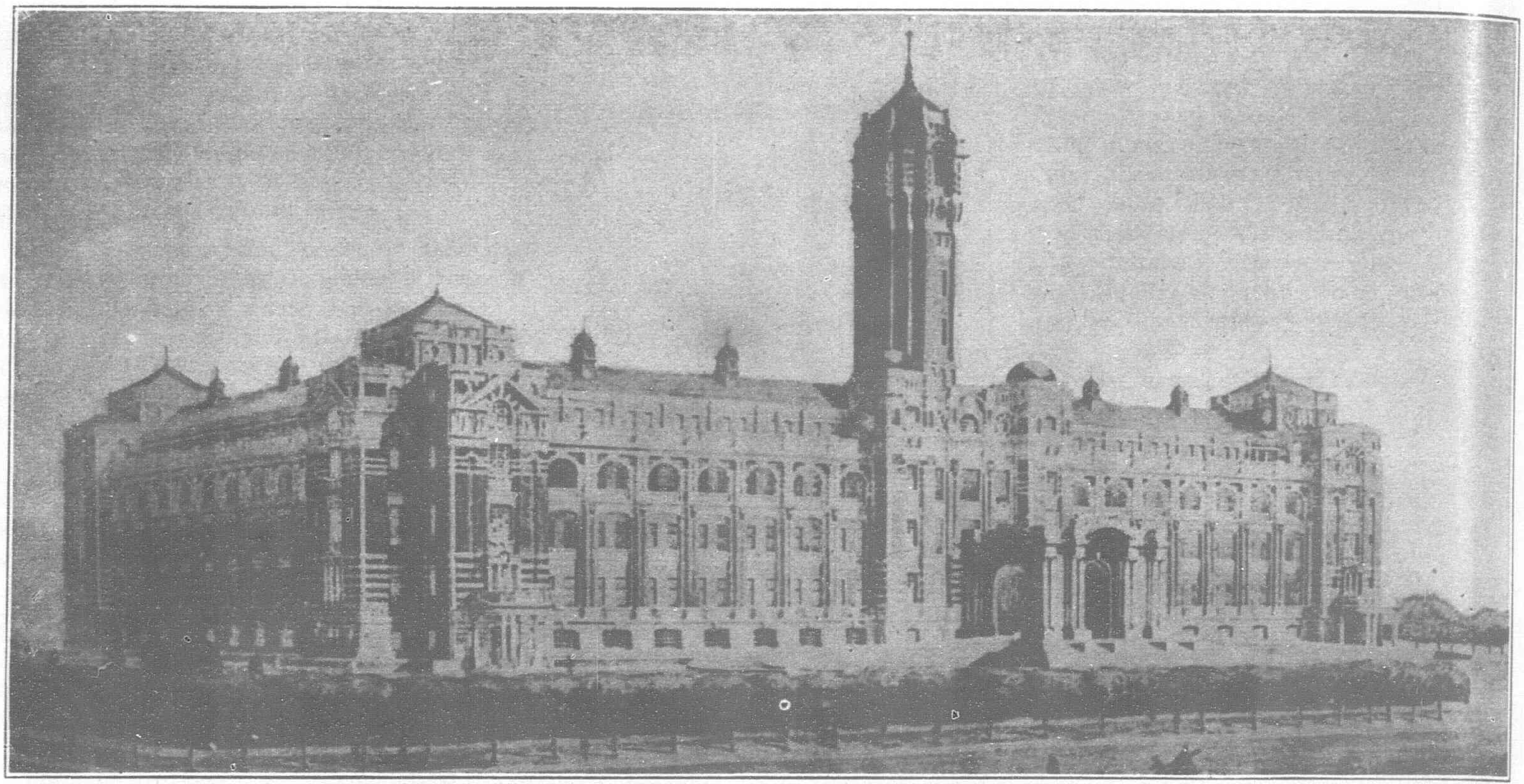
Foundation :—
Diameter of the bottom area ... = 90-ft.
Thickness (depth) ... ... = 12-ft.
Shaft :—
Height ... ... =660-ft.
External diameter at base ... = 57-ft. 9-in.
External diameter at top ... ... = 4-ft. 6-in.
Wall thickness at base ... ... = 33-in.
Wall thickness at top ... ... = 6-in.

Amount of concrete :—
Foundation = 225 cubic *tsubo* = 47,759 cub. ft.
Shaft ... = 550 cubic *tsubo* = 116,745 cub. ft.
Steel reinforcement :—
Foundation ... ... = 79 tons.
Shaft ... ... = 290 tons
Diameter of steel reinforcement :—
In the foundation = 1-in., $\frac{7}{8}$-in., $\frac{3}{4}$-in.
In the shaft ... = $1\frac{1}{8}$-in., 1-in., $\frac{7}{8}$-in., $\frac{3}{4}$-in., $\frac{5}{8}$-in., $\frac{1}{2}$-in.

American Capital in Japanese Commercial Alliance

THOSE who take more than passing note of American business activities in the Far East will be attracted by the interesting commercial alliance which recently occurred in Japan. The Nippon Electric Co., an allied company of the International Western Electric Co. of New York, and said to be the oldest concern with participating foreign capital in the Mikado's realms, has joined forces with the Sumitomo Electric Wire & Cable Works, of Osaka, one of the oldest commercial enterprises in Japan. A new company has been organized to be known as the Sumitomo Electric Wire & Cable Works, Ltd., for the production of power, telephone and telegraph cable. It has started with a capital of Y.10,000,000, or about $5,000,000. Under the provisions of the alliance, the Nippon Electric Co. has granted to its new associate the right to use all its manufacturing and engineering information and patents which it receives from Western Electric Co., covering the production of cable. The Sumitomo company, which is primarily a manufacturing concern, on its side agreed to assist the Nippon company in the sale not only of electric wire and cable but also all its other products.

In the association of the Sumitomo and Nippon Electric companies there is an element of historic interest. The House of Sumitomo is one of the oldest banking and commercial organizations in the empire. Its activities were first recorded in 1690, when, with the discovery of the Besshi copper mine, the family became engaged in mining. In 1868, after the restoration of the power of the emperor, the Sumitomo interests began to broaden, and there were founded in quick succession the Sumitomo Copper Sales Co.; the Sumitomo Warehouse Co. with branches at Tokyo, Osaka and Kobe; the Sumitomo Bank, Ltd.; the Sumitomo Steel Works; the Sumitomo Fertilizer Manufacturing Co., and the Electric Wire & Cable Works. The Nippon Electric Co. dates back to 1895 when the Western Electric Co. founded an agency in Japan. At that time the laws of the island empire prohibited the introduction of foreign capital into Japan for participation in any commercial enterprise. This ban was lifted in 1899 and the modest agency of the great American electrical concern was broadened into the Nippon company, with a capital of Y.200,000 Its present authorized capital is Y.10,000,000. Baron K. Sumitomo, the managing genius of most of the new enterprises which bear his name and one of the heads of the new company, is a great admirer of American methods. He has made several personal and extensive investigations of industries and mines in the United States and Europe. In 1911 he was created a baron as a reward for the noteworthy services he had rendered to industrial Japan. He will have as his associate in the new enterprise, K. Iwadare, managing director of the Nippon Electric Co.—*Electrical Review.*



New Formosan Government Building at Taipeh

Progress in Formosa

As in Korea, the semi-tropical island of Formosa is progressing steadily under the benefits of Japanese rule. From a land of savages it has become a self-supporting community contributing its natural riches to the markets of the world in ever increasing quantities. The special laws promulgated to cover conditions in the island when Japan first entered into its possession have given place to a new set of regulations and the entire government has been reorganized on lines similar to those which prevail in the administration of the British crown colonies.

Political Advances

The great problem which has always confronted the Japanese administration is the question of assimilating the native Formosan Chinese and bringing them to the point where they can be governed by the same laws existing in the home country. As one means of accomplishing this end the government-general has been sending many students of merit to complete their education in the schools in Japan. The number so far sent has not been sufficiently great to produce any appreciable effect but the idea is pronounced feasible and the educational authorities are now advocating sending at least one-half of the body of Formosan students to Japan every year to complete their education. Recently there has been some agitation for a representative legislative assembly in the island but the time has not come for such a great innovation. But government support is being given a scheme to send Formosan representatives to the imperial diet, with similar rights and privileges granted to the Japanese legislators.

Finances

Japanese rule in Formosa, however, can only best be gaged from its financial standpoint, and as in the case of Korea, the figures prove that material advantages have accrued to the natives which to a large extent offset their backwardness in political development. From an island province ruled over by grasping Chinese mandarins into whose coffers poured the wealth of the people, Formosa has now an annual budget which represents an increase of 1,200 per cent. over that of 25 years ago when Japan took hold.

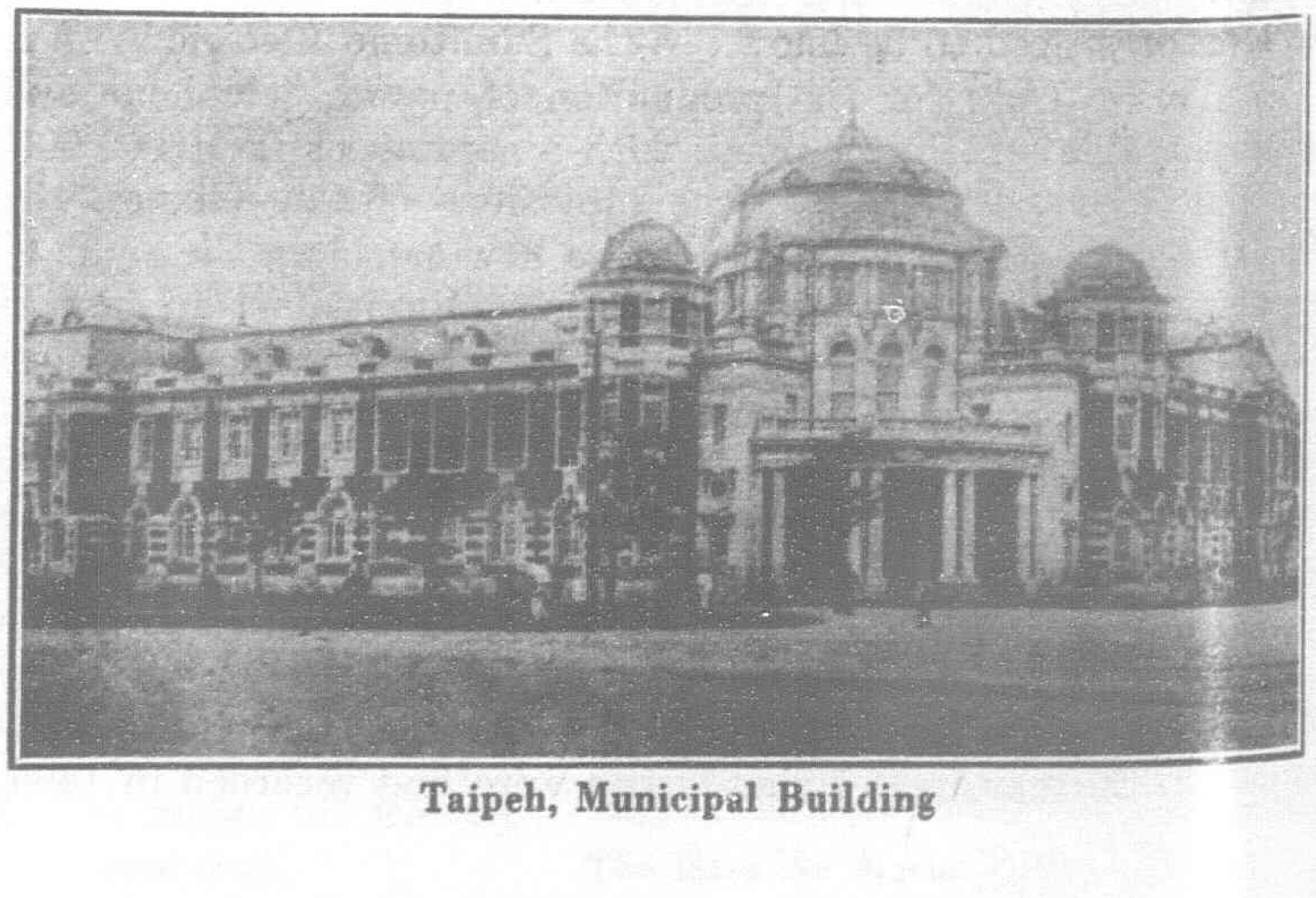
The following table showing income and expenditures of the island government in 1897 after 2 years of Japanese rule, in 1912 after 17 years and to 1921 after 27 years are illuminating:—

INCOME

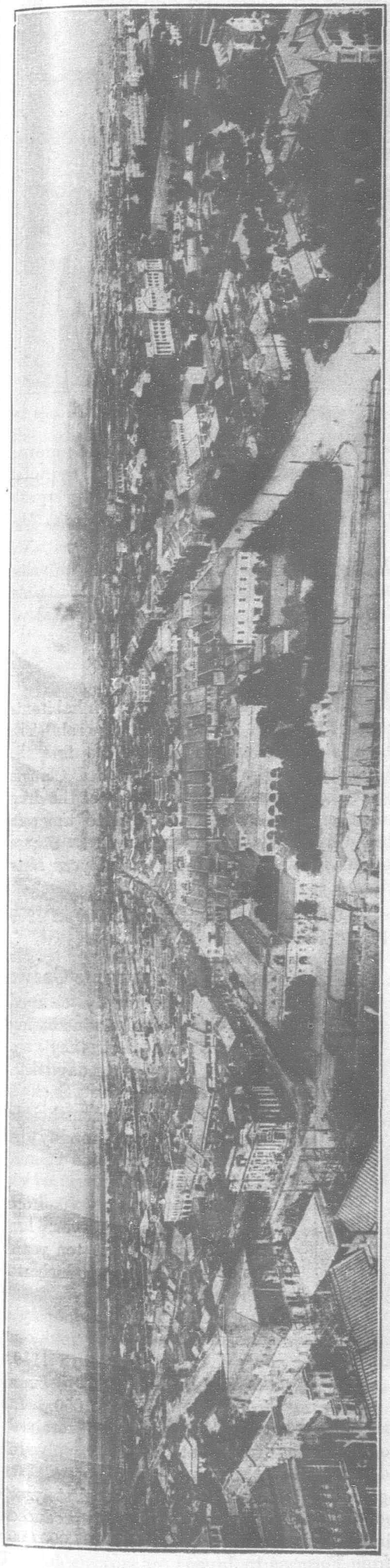
	Ordinary Yen	Extraordinary Yen	Total Yen
1897	2,624,158	71,027,938	9,652,098
1912	4,259,020	17,764,937	60,292,057
1921	88,551,005	26,405,854	114,956,859

EXPENDITURE

	Ordinary Yen	Extraordinary Yen	Total Yen
1897	5,913,243	3,738,855	9,652,098
1912	22,687,771	21,500,805	44,288,805
1921	79,639,756	35,317,107	114,956,859



Taipeh, Municipal Building



GENERAL VIEW OF TAIPEH

A Self-Supporting Colony

For the first ten years of Japanese rule deficiencies in revenues were made good from the Japanese treasury, but since 1905 the island has been self-supporting. In fact in 1909 the government-general exchanged a part of the sugar consumption tax with the national government for the privilege of maintaining its own customs service and collecting the customs tax on the imports of the island. The tariff is the same as that of Japan. In 1914 the whole revenue from the consumption tax on sugar was surrendered to the national treasury.

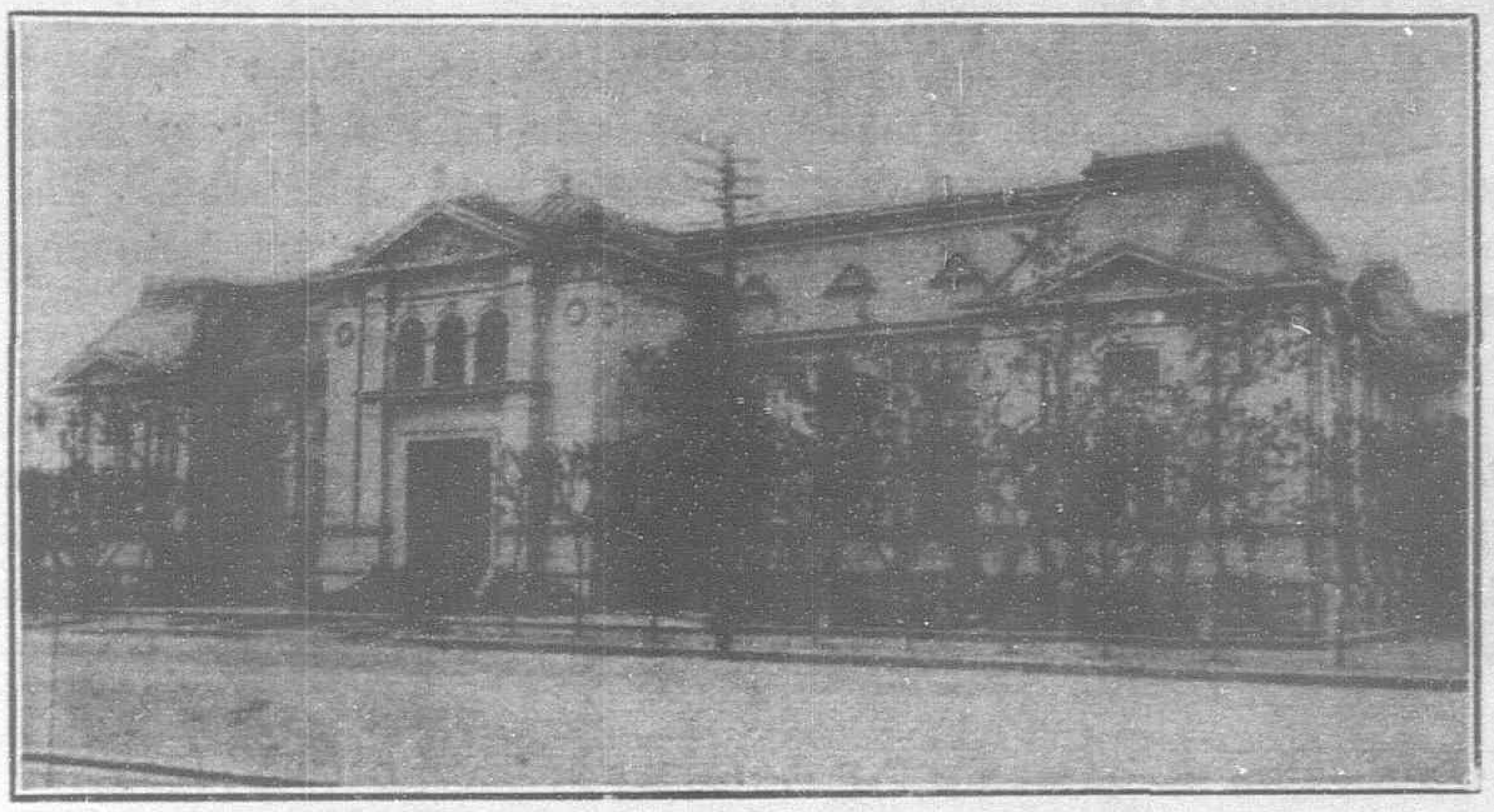
Agricultural Wealth

Essentially an agricultural country, like other parts of China no real effort was ever made to increase the acreage and yields of the staple crops until the Japanese assumed control. In 1899, or three years after annexation, the cultivated area of Formosa was only 870,806 acres, while in 1919 it had increased to 1,740,915 acres. At the same time the value of the crops rose from Y.72,000,000 in 1909 to Y.245,650,000 in 1919.

Owing to the tropical climate it is possible to raise two crops of rice a year in some parts of Formosa, and it is even possible in especially favored localities to obtain three crops a year. The quality of Formosan rice is better than rice from China and it is therefore slowly finding favor in the home country. In fact Formosan rice is shipped to Japan and cheap Chinese rice is imported to take its place in Formosa. In 1919 the production of rice was 4,922,000 *koku,* valued at Y.132,220,000.

Sugar Industry

In the development of a modern sugar industry, Japan has shown with governmental stimulation in Formosa that it is possible to profitably produce sugar in climatic and soil under conditions closely resembling Louisiana. This industry, however, is confined to the southern parts of the island, around Taichu, Kagi and Tainan. In 1919 some 288,622 acres were planted with cane, and 486,355,000 *kin* of raw sugars were extracted from the cane raised.



The Financial Heart of Formosa: Head Office of The Bank of Taiwan

Tea is another important field crop, whose annual production is about 19,000,000 *kin,* valued at seven or eight million yen. Sixty per cent. of the tea is Oolong tea which is exported to the United States.

Forests and Lumbering

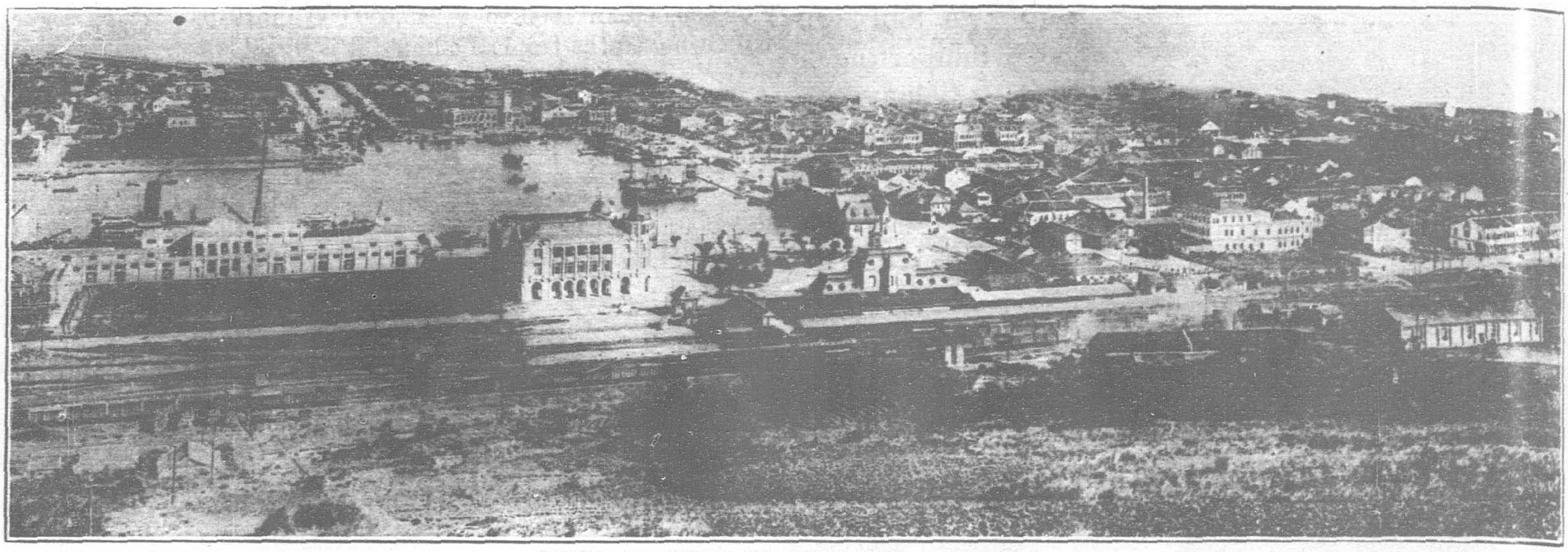
At least half of the island of Formosa is mountainous country covered with fine virgin forest. According to the investigations of the authorities there are 2,234,945 acres of government and private forests which have not yet been exploited. The government maintains a saw mill on Mt. Ari which is very well known, and its operations extend over 26,500 acres, which are estimated to contain 80,000,000 board feet of fine hard-wood timbers. Many of the trees are over 20 feet in diameter and are said to be over 3,000 years old.

The future of the timber of Formosa is very bright. The woods are all hard woods, and they have beautiful grains and markings which make them especially desirable for interior decorations and fine furniture making.

Mines

The number of mines in Formosa is increasing every year. Between 1898 and 1919 the production of the mines increased over 100 times in value: in 1898 gold, coal, oil and sulphur were produced valued at only Y.112,000: in 1919 there were 934 mines in operation which produced Y.11,170,000 worth of metals and minerals.

There is not much coal in Formosa and at first its production was greatly hampered by the old-fashioned methods of mining in use. But from 1905 new machinery has gradually been installed in all the mines, so that in 1919 production reached 1,080,607 tons, worth Y.8,825,000.



GENERAL VIEW OF KEELUNG, FORMOSA

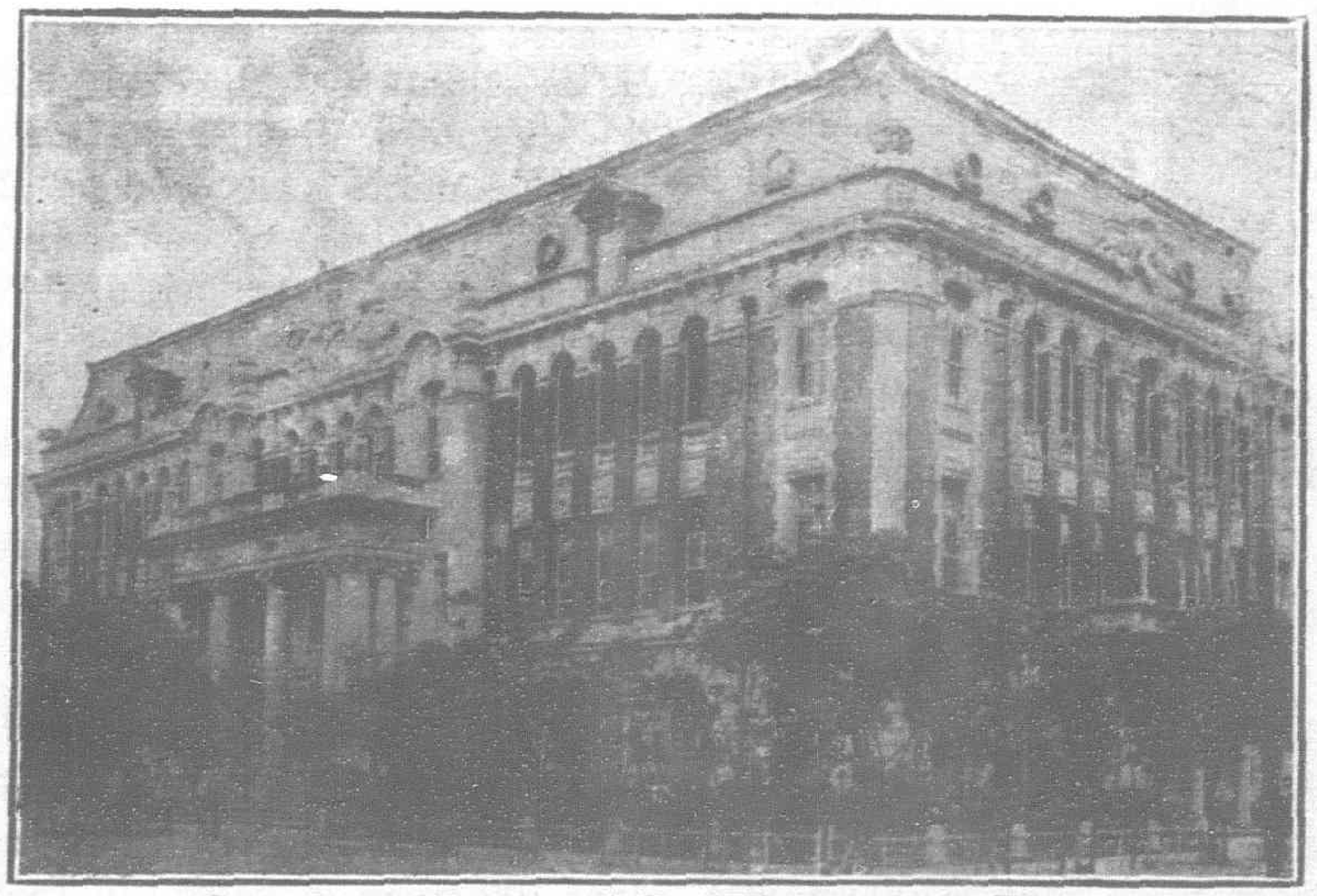
Other Industries

The development of many other industries and agricultural products during the past twenty years has been remarkable. The most important agricultural products are listed in the following table, all figures being given in thousands:—

	1900	1919
	kin	*kin*
Potatoes	404,000	16,000,000
Peanuts	120	350
Beans	50 *koku*	128 *koku*
Wheat and barley	20 *koku*	40 *koku*
	kin	*kin*
Yellow hemp	1,440	4,740
Other hemps	1,020	1,720
Indigo	1,730	3,360
Tobacco	196	1,120
Oranges	2,200	9,610
Bananas	10,536	37,533
Live stock (thousand omitted)		
Cattle and water buffaloes	193 head	404 head
Swine	480 head	1,194 head
Silkworm cocoons	264 *koku*	828 *koku*

Sea Wealth

In early years the value of water products was not known, but in 1914 the value of the fish caught in Formosan waters was Y.1,662,000. In 1919 this had reached Y.5,058,000, while the value of manufactured foods from marine products was in 1914 only Y.384,000, and reached in 1919 Y.1,427,000. Other manufactured foods, other than fish, increased in value from Y.1,067,000 to Y.2,427,000 during the same years.



Government Bureau of Civil Engineering, Taipeh

Foreign Trade of Formosa

Formosa's foreign trade includes trade with Japan, Chosen and Kwantung. It is carried on from the ports of Tamsui, Keelung, Anping and Takao. Six lines of steamers are regularly engaged in the trade with China from these four ports.

In 1898, the foreign trade of Formosa with Japan and all other countries was only Y.30,000,000, both in imports and exports. In 1907 the total foreign trade was Y.50,000,000. By 1910 as the result of an increased circulation of money, and improved banking conditions, and the growth of the sugar trade, the total reached one hundred million yen. In following years the growth was: 1912, Y.125,000,000 in exports and imports: 1917, Y.234,690,000 and in 1919, Y.332,580,000.

With the fall in the price of sugar, however, the future value of the foreign trade, particularly the value of exports, will certainly fall far below the totals for 1919.

Government Monopolies

Certain industries important for the welfare of the inhabitants are monopolies of the Formosan government-general. The most important of these is the opium monopoly. At first the trade was almost a necessity for the opium debauched Chinese inhabitants and to protect them from continued abuse of the drug the government-general at once undertook to regulate the sale and manufacture. The sales of the monopoly, under a license system which is strict and equitable, have decreased year after year since the very beginning of the Japanese rule.

In 1899 sales were 47,000 *kwan*, dropping to 38,000 in 1909 27,000 in 1916 and to 19,278 *kwan* in 1919.

Sales Drop; Income Grows

It is frequently charged that the monopoly is increasing its sales and that they are actually greater to-day than they were in 1899. Such a charge is pure and malicious nonsense, as can readily be understood from these figures.

The price of opium, which the monopoly imported from Turkey before the war, has risen during the past ten years like everything else, to hitherto unheard of levels.

In 1899 the monopoly's sales of 47,000 *kwan* produced only Y.1,539,000, but in 1919, the sales of 19,278 *kwan* brought in Y.6,947,000. In 1899 there were 20 persons in every thousand who received government licenses to use the drug, but in 1919 only 15 persons in the thousand were still smoking opium.

The government-general's salt monopoly in the first year of its operation produced 39,000,000 *kin* of salt. In 1903 it produced 50,000,000 *kin*, while in 1919 the production reached 107,000,000 *kin*. Salt is exported from Formosa to Japan.

Camphor Important

The camphor monopoly found the production of camphor seriously on the decrease up to 1899, so that it began to plant trees in government-owned forests. In 1919 about 130,000 acres had been replanted, and production which in 1904 was only 720,000 *kin*, had risen to 3,513,000 *kin*. Waste products from camphor refining brought in Y.317,000 of revenue in 1900, while in 1919 they produced Y.917,000. Of course, the rise in price of all camphor products accounts largely for this difference in value.

The tobacco monopoly was established in 1906. It makes pipe tobacco, cigarettes and cigars. The monopoly controls the planting of 1,200 acres, which produced in 1919, over 1,130,000 *kin* of tobacco, valued at Y.9,709,000. This is an increase of over 55 per cent. in only fourteen years.

Manufacturing Future

The future of manufacturing industries in Formosa is dependent on the development of the water power resources of the island. The government in combination with private capital is now developing 130,000 kilowatts of power, which will be used to develop chemical industries.

It can be seen from this sketchy review of industry in Formosa that the development under Japanese rule has been very marked. Great credit is due to the unflagging zeal of the officials who have been in charge of the never-ceasing governmental measures to make the island a self-supporting colony, and a valuable asset to the Japanese empire.

The Clyde's Largest Dredger for India

THE *Gunga* launched by William Simons & Co, Ltd., to the order of the commissioners for the port of Calcutta, is the largest dredger yet built on the Clyde, and is the third dredger built by Messrs. Simons for the improvement and maintenance of the River Hooghly.

The dredger is 370-ft. in length × 57-ft. 6-in. × 24-ft. 6-in., and has a hopper capacity of 80,000 cubic feet, and has been specially designed for the unique character of the dredging to be done on the Hooghly.

The suction pipe is arranged to dredge to a depth of 45-ft., and is designed with a trunnion at each end of the well so that dredging can be done when the vessel is propelling either ahead or astern. Or alternatively, dredging can be done while the vessel is moored to anchors either ahead or astern.

Owing to the light specific gravity of the drift sand and silt deposited in the river Hooghly during the flood season, special attention had to be given towards providing appliances which would eliminate as far as possible the loss of material in the overflow from the hopper. The dredger is accordingly fitted with the "Simons" patent sand baffling arrangement. This arrangement has been proved most effective in its action in reducing the loss in overflow to the minimum.

The hull and machinery are constructed to Lloyd's highest class. The main deck is of steel, sheathed with teak. Steam and hand-steering gear is fitted, and a very complete installation of electric lighting is provided, including one searchlight.

The propelling and pumping engines are placed in two independent compartments. The propelling power is supplied by two sets of triple-expansion surface-condensing engines, embodying all the latest improvements in marine engine practice, including steam and hydraulic reversing gear, steam turning gear, independent circulating pumps, automatic feed pumps, feed heaters and filters, large evaporators for feed water make up, and a complete outfit of auxiliary feed and bilge pumps. Steam is generated by four large single-ended horizontal multitubular boilers, constructed to Lloyd's rules for a working pressure of 180-lbs. These boilers are designed with ample surface for burning Bengal coal under forced draught. Two ash ejectors are fitted in the stokeholds. The pumping outfit, placed forward of the hopper in an independent engine room, consists of one set of triple-expansion engines, with independent condensing plant and circulating pumps, complete with all modern fittings. The pump engines are coupled direct to a centrifugal sand pump specially designed to raise and discharge about 5,000 tons of sand and silt per hour. The pump is connected to a suction pipe, placed in a well at fore end of the vessel, being fitted at upper end with a massive swivel bend which serves as a trunnion or hinge upon which the pipe is free to move vertically. The suction end of the pipe is fitted with a specially designed drag nozzle a suit the character of the material to be dredged while a grid is also fitted to the nozzle to exclude material which might choke or damage the pump. The suction pipe is controlled by a steam winch placed on deck.

The discharge pipe from the sand pump is carried over the hopper and fitted with trimming doors.

The bow winch has three large independent wire rope drums for working long lengths of heavy steel wire rope and two cable holders for chains. The winch is driven by a vertical high pressure engine, the gearing throughout being of steel. At the stern a large windlass is fitted having two independent cable holders and two warping ends of extra large dimensions.

The material in the hopper is discharged through the bottom by cylindrical valves hydraulically controlled.

The cabin accommodation for officers and crew and the ventilation of the ship throughout have been specially designed for a hot climate.

The *Gunga* has been constructed under the direction of Mr. J. Angus, M. INST. C. E., engineer and London agent to the Calcutta port commissioners.

Admiral Line Gaining Strong Position

WHEN, early in July, four large United States shipping board vessels lay at one time at Pier B, of the port of Seattle, the largest commercial wharf in the world, a graphic picture was presented of the rapid progress being made in the effort to win ascendency for the American flag in the commerce of the North Pacific, via the great circle trade route to and from the Orient. The mammoth terminal, constructed by Seattle at a cost of more than $5,000,000, is justifying the faith of its builders by becoming the home berth of an increasing fleet of American ships engaged in trans-Pacific commerce.

Pier B, of the great terminal is being used as the American terminus of the Admiral Line, which inaugurated the all-American passenger and freight service between Puget Sound and Oriental ports, with the sailing of the *Wenatchee* on April 9, followed by the *Silver State* on July 9. The four ships which lay at Pier B were the passenger and freight liners *Wenatchee*, *Keystone State* and *Silver State* and the freighter *Edmore*, all shipping board vessels allocated to the Admiral Line for operation. They represent an investment by the people of the United States of $27,000,000.

It is expected that additional vessels will be allocated to the Admiral Line for this service, making the capacity for passengers and freight of the American line far greater than that of any of its foreign competitors which, in the past, have carried the bulk of American commerce out of Puget Sound. The vessels which have so far sailed in the service have carried large cargoes, encouraging the belief of Admiral Line officials that American ships can gain control of the trans-Pacific passenger and freight business originating in the United States, which constitutes the bulk of the traffic.

Pier B was recently completed at a cost of $2,500,000. It is 2,500 feet long and 365 feet wide, larger in area than Pier A, the first constructed, which is 2,540 feet long by 310 feet wide. The piers are equipped with transit sheds and modern machinery, insuring rapid and economical handling of cargo and giving American ships a decided advantage in this respect over Canadian and British ships in British Columbia ports.

FAR EASTERN IRON AND STEEL

JAPAN'S PIG IRON OUTPUT SHOWS DECREASE.—Japan's pig iron output during August amounted to 15,785 tons, comprising 2,967 tons at Kamaishi, 2,334 tons at Wanishi, 6,732 tons at Kenjiho (Chosen), and 3,752 tons at Penchihu (Manchuria), all operated under Japanese management, showing a decrease of 328 tons from the previous month.

An active demand for pig iron caused an increase of sales and 760 tons were contracted for. Of these sales Kamaishi pig iron totalled 3,158 tons, Wanishi 3,465 tons, Kenjiho 3,934 tons, Penchihu 6,685 tons, and Totetsu 3,518 tons, showing an increase of 3,653 tons over the previous month.

The present amount of stock on hand totals 172,488 tons, Kenjiho 52,293 tons, Penchihu 30,107 tons, and Totetsu 20,360 tons, showing a decrease of 8,163 tons from the previous month.

The output is expected to decrease more, as the Penchihu Colliery and Mining Company has proposed to totally suspend operations. This will naturally tend to increase prices although in spite of the outlook the current prices remain depressed.

Wanishi pig iron No. 1 is now quoted in the neighborhood of Y.63.

* * *

INDIAN STEEL FROM NEW FURNACES TO BE CHEAPEST IN WORLD.—A great steelworks is being established in Bihar and Orissa capable of producing three-quarters of a million tons of pig-iron and half a million tons of steel annually. It is believed that India is capable of producing the cheapest steel in the world.—*Reuter.*

* * *

STEEL RAIL REDUCTIONS.—The United States Steel Corporation in announcing a reduction of seven dollars a ton has reduced the price of standard rails to $40.

Mr. Gary, president of the Corporation, has said that the present costs of production did not justify this attention, but he hoped and expected that the reduction in freight rates, together with larger operations, would have a beneficiary effect upon the costs.—*U.S. Navy Radio through Reuter.*

* * *

NEW COMPANY TO OPERATE IN JAVA.—Wm. H. Muller & Company, of Rotterdam, have started at Sourabaya, a branch establishment with sub-branches at Batavia and Bandoeng, for the sale of iron, steel and railway material. A start has likewise been made with the foundation of other sub-branches in Java, while a plan has been formed to be represented also in Borneo and Sumatra. At Sourabaya and Batavia there are two warehouses for the storage of iron and steel, viz., for bar iron, beams, plates, wire and wire nails, tubes, etc., and also for railway material, including rails for narrow-gauge lines.

* * *

TO AID JAPAN'S IRON INDUSTRY.—There will be an indefinite delay in making effective the recently enacted Japanese iron industry encouragement act, which was to have become operative on July 1. One provision of the act is that any person engaged in the iron industry with equipment to produce at a single place 5,250 metric tons or more yearly of pig iron or steel may be exempt from taxes on his industry and from income taxes on the profits yielded in the year in which the industry is started and for the following ten years. The 5,250 metric tons mentioned shall mean 2,500 metric tons in the low phosphorus pig iron industry.

* * *

PROPOSED JAPANESE TRUST.—The combination of six private iron and steel companies in Japan is proposed by the government's financial and economic investigation committee, as a remedy for the present financial difficulties of the industry in Japan, according to a report. It is suggested that the Japanese government should give substantial aid to the combined companies, which would have an output about equal to that of the Wakamatsu State Steel Works, while these private plants and the government works together would control about 90 per cent. of the country's total production.

* * *

GOVERNMENT IRON WORKS TO RE-OPEN: JAPAN.—Stimulated by a dearth of stock at the opening of the season for demand, the steel and iron market has begun to put on an air of animation with an upward tendency of price.

The local iron market has risen from the bed-rock rate of Y.54 to Y.57 and many trades are being made. The cargo movement of iron is expected to revive suddenly when the weather improves.

Indications point to the possibility of a further rise of prices.

In anticipation of reanimation in the iron market, the Government Steel Works has decided to resume operations at some of its iron foundries. Sales of Government Steel Works iron total 29,000 tons monthly.

MACHINERY MANUFACTURERS.—Sasagawa & Co., 144 Imaki-cho, Nishi-ku, Osaka, have opened offices under the managership of M. K. Sasagawa.

* * *

THE SHIRAI STEEL MANUFACTURING CO. was organized recently with a capital of Y.50,000, fully paid up, to manufacture steel. Office at Nagase-mura, Kawachi-gun, Osaka-fu. Manager: Mr. K. Shirai.

* * *

SHANGHAI ARSENAL MAKES WATER PIPES.—The Shanghai Arsenal is manufacturing water pipes in all sizes by the method of vertical casting. Thickness uniform, tests under different pressures.

* * *

CHINA IRON WORKS CO. BEING ORGANIZED.—Mr. Nieh Gee-gih, returned from abroad, with three other experienced Chinese engineers who have studied in Europe and America for a long time, is organizing the China Iron Works Co. at Woosung Creek. The new company is to manufacture looms, weaving machines and other engineering tools and supplies and is to be capitalized at $300,000 in 3,000 shares of $100 each. Applications for registration have been made to the ministry of agriculture and commerce.

* * *

JAPANESE STEEL-TRADE.—September and October are usually months of active demand in Japan, and steel manufacturers, importers and dealers are expecting a revival in trade to start at this season. Aside from seasonal signs, they predicate their belief on factors quite generally acknowledged as of barometric value.

Stocks of iron and steel products held in customs compounds in Yokohama, Kobe and Osaka, and in public and private warehouses at the beginning of this year were very large. No close estimate was obtainable, but the aggregate was believed to be over 300,000 tons. Just how much of this has been consumed is not known, but stocks have diminished considerably in size. Similar stocks held by the Yawata (Government) Iron Works in Kyushu, at the commencement of the year, were, according to the *Japan Weekly*, estimated at 300,000 tons, and these have almost entirely been disposed of at an average monthly consumption of 20,000 tons. Considerable price concessions were necessary to move this stock. Much of it, comprising heavy and light rails, was eagerly picked up by the government railways and by industrial operators. A resulting scarcity in some shapes and sizes of steel is evident.

Activity is particularly centered in the several hydro-electric power undertakings which have been under way since last year. In Japan proper three operations are planned for, having as their objective the furnishing of power, through three distinct lines of transmission, to the cities of Kobe, Osaka and Kyoto to the south and Yokohama and Tokyo to the north. Ultimately the three operations will be merged into one company. Much of the material required for this work, such as transmission towers and cables, will be of American manufacture. Building on a large scale is under way. At Tokyo an American firm has the contract for the construction and erection of three steel-frame office buildings, all of the steel materials to be of American manufacture. The Yokohama Specie Bank has purchased the steel in the United States for its new bank and office building for Tokyo.

There is a demand for black sheets of thin gauge for galvanizing in Japanese plants; for tin plate to supply the salmon canning factories at Hakodate; for wire rods for rope and cable manufacture, and other wire products; and for electrical sheets for Japanese-made motors, dynamos, and transformers.

Prices of steel commodities are believed to have reached bottom and will be influenced for a time by the movements in German quotations. German steel bars, according to the *Japan Chronicle*, advanced in price the early part of September Y.15 to Y.128 per ton (2,240 pounds), while black sheets moved up Y.25 to Y.163 per ton.

The following table presents a comparison of Japanese imports of iron and steel products during August 1920, with these for August of this year:

Japan's Imports of Iron and Steel in August.

Articles	August 1920. Yen	August 1921. Yen
Pig iron	1,843,000	784,000
Steel rods, bars, plates, sheets, and other	17,863,000	7,030,000
Rails	1,344,000	923,000
Total	21,050,000	8,737,000

Each group of items shared in the decline, the average decrease amounting to 58 per cent.

Engineering, Financial, Industrial and Commercial News

AGRICULTURAL

Nantungchow to have a Perfect Agricultural Experiment Ground.—The five salt refinery companies in Nantungchow—Dah-yue, Dah-lai, Dah-foong, Hua-chen and Dah-yu-tsing—have jointly proposed the establishment of a perfect agricultural experiment ground in the district to work for the improvement of China's agriculture. It is reported that a fund has been advanced by some Chinese banks in Shanghai and that Prof. Kao Tan-ching and Prof. Yuan Chung-chow have been asked to take charge of the organization.

Cotton Production of Kiangsu.—The following report prepared by the Chinese Cotton Mill Owners' Association, Shanghai, is quoted from the *Shanghai Journal of Commerce* :—

Year	Kiangsu Province	Nantungchow District
1918	4,128,696 piculs	2,142,855 piculs
1919	2,763,160 ,,	1,500,000 ,,
1920	3,022,210 ,,	1,030,000 ,,

Japanese Concession, Borneo.—A Japanese company has obtained a concession of 35,000,000 acres in Borneo for the cultivation, with the help of Japanese settlers, of coffee, rubber, coconut and rice.

AUTOMOBILE

Auto Bus Service, Soochow.—Mr. Pan Loo-kao is organizing an automobile transportation company at Soochow with a capital of $200,000. A petition has been submitted to the authorities for approval and registration.

Chinese Manufacture Automobiles.—The Yangtze Machinery Works has turned out an automobile, which, when compared in quality and workmanship, is stated to be in no way inferior to foreign makes. Patent rights have been obtained from the ministry of agriculture and commerce. The company now intends to enter into competition for the China market with other manufacturers.—*Bureau of Economic Information.*

Shanghai-Taichong Auto Bus Service.—The automobile road from Shanghai to Tai-chong has been completed, though several important bridges in the central part of the line remain to be built. Great efforts, however, are being made to finish the uncompleted work within forty days, work which was delayed by the continuous rain. Automobiles ordered from abroad have already arrived at Shanghai and office buildings, car sheds, warehouses and station buildings are expected to be ready at the end of November. The service will be inaugurated within the year and at present the motor-men and conductors are busily engaged in driving for practice.

Haining-Changan Automobile Road Proposed.—Messrs. Wong Zu-foo and Tsai Tso-hsu, gentry of Hai-ning, Chekiang, have proposed to construct a motor road from Hai-ning to Chang-an via Dah-chin-chang, Yang-chiar-chong, Wu-chiar-to and King-chiar-jao measuring about 23 *li* with three stations to be established on the line. The transportation service will be inaugurated with two passenger auto-buses and two freight buses.

AVIATION

New Aeroplanes for China.—Sixty aeroplanes ordered by the Peking aeronautical bureau from Messrs. Vickers & Co. have arrived at Shanghai.

Air-Service from Peking to the Great Wall.—The Aeronautical Department has formulated a plan for air-service from Peking to the Great Wall carrying passengers. The flights will be started at 9.30 a.m. of October 27, and henceforth service will be operated on Tuesdays and Thursdays while Great Wall touring on Wednesdays. The fare is charged by time instead of by distance, Peking flight for half an hour at $15 and Great Wall travelling for 1½ hours at $30. The whole journey from the Wall to the capital takes only 1½ hourse.

BRIDGES

Railway Bridges for China.—The Chinese government has authorized the Netherland Syndicate, Ltd., for China at Amsterdam to place orders in Holland for the construction of 150 railway bridges of various dimensions. The orders will be given to the firm of De Vries Robbe & Co., at Gorinchem and to the Construction Labor Yards, Ltd., formerly de Croo & Brauns, Amsterdam. These bridges are to be constructed for the eastern part of the Lunghai railway, which is now being built under the direction of three Holland engineers.

Siamese Railway Bridge Specifications.—Tender forms, including general terms, and specifications for the supply of superstructures of 8 steel bridges for the Siamese State Railways are en route to the bureau, cables American Consul James P. Davis from Bangkok. The total length will be about 600 metres. The arrival and availability of the forms and specifications will be announced later.—*Commercial Reports.*

BUILDINGS

Railway Hotel, Tsinan.—It is reported that a railway hotel will be established at Tsinan by the Tientsin-Pukow Railway Administration.

Building Company, Mukden.—The Mukden Building Co., architects and contractors, organized by Messrs. Wang Kan-chen and Pang Ching-yao with a capital of $100,000 Mukden currency, has been established.

New Girls' School: Tokyo.—The Tokyo Jogakkan Girls' School will build on a new site at a cost of Y.300,000.

New Work in Nantungchow.—As the removal of Nantungchow city wall is nearing completion, the construction department at Nantungchow has formulated a plan for erecting new market buildings on the old city foundation and preparations for the work are being made by the department.

Hangchow to have Railway Hotel.—The Shanghai-Hangchow-Ningpo Railway administration has been authorized by the ministry of communications to build an up-to-date railway hotel at the West Lake, Hangchow, which is estimated to cost $30,000.

COMMERCIAL

Harbin Agriculture Trading Co.—Reports from Peking state that General Chang Tso-lin has purchased control of the Agriculture Trading Company of Harbin by paying $500,000, and is planning to expand the company by investing an additional $2,000,000.

Chinese Patents.—Chen Hsiang-yuan, of the Chung Hwa Domestic Industrial Co., Ltd., has petitioned the ministry of agriculture and commerce for monopoly rights of the company's invention of a process for manufacturing magnesium carbonate from wastes.

China Commercial Attaches.—The ministry of commerce and agriculture has pointed out to the cabinet that, in view of the fact that China's trade interests abroad are continually increasing and of the great field for their further development, commercial attachés should be appointed not only in the great countries but specially in those which have become treaty powers since the war.

The Ibaraki Smokeless Coal Selling Co. with a capital of Y.2,000,000, quarter paid-up, was established recently.

DEVELOPMENT

Plan of the Ministry of Agriculture and Commerce for Development of China's Fishery.—With a view to placing China's fishing industry on a proper footing, the ministry of agriculture and commerce is preparing to take the following measures :—

(1) To organize a fishing training school at Chefoo, Shantung, in addition to other two such institutions already established at Ding-hai, Chekiang, and Haichow, Kiangsu, and to send several qualified students abroad every year to pursue higher study in fishery.

(2) To establish fishing guilds in the maritime provinces for mutual advantages of fishermen and fishmongers and to draw up a set of regulations governing such organizations.

(3) T establish fishing markets at important cities along the coast, only one market being allowed within a certain designated area, and regulations for such organizations to be set up.

Sugar and Cotton Industries.—The Mitsubishi Company is said to be interested in the development of the sugar and cotton spinning industries in Manchuria as a result of a recent visit made by Boron Iwasaki.

New Companies Under Organization.—According to latest report, the following corporations are being organized :

Kiu Kee Lumber Co., Ltd., Shanghai.
Yue Chong Stock and Produce Exchange, Kiangsi.
Ningpo Flour Exchange, Chekiang.
Hankow Cotton Exchange, Hupeh.

Shantung Industrial Commissioner Fulfils His Duty.—Regarding the development of industry in the province of Shantung, Mr. Dien Pu-zan, industrial commissioner at Tsinan, has decided to take the following measures :—

(1) Encouraging people to exploit agricultural lands so as to bring them under cultivation.

(2) Operating mineral resources by subscribing a sufficient capital among the people.

(3) Taking up fishery along the coasts of the province so as to place the fishing industry on a proper footing.

(4) Encouraging forestry so as to cultivate timber on a large scale.

The Future Prosperity of Woosung.—Commenting on the improvement work of Woosung, the *Shanghai Journal of Commerce* calls the coast town China's Manchester, for there is good reason to believe its possibly becoming a commercial as well as a manufacturing centre at the mouth of Whangpoo river in a few years. The extensive scheme which involves constructing roads, erecting bridges, laying out tramways, etc., has been formulated by an experienced foreign surveyor, and the work is expected to be completely carried out within ten years. Among the new successful works are the completion of two cotton mills, Hua Foong and Dah Chung Hua, and the construction of a modern road at the expense of the two mentioned factories.

New Companies Under Organization.—According to report, the following corporations are being organized :—

Dung Woo Shun Warehouse, Ltd., Chihli.
Mih Shan Coal Mining Co., Kirin.
Peking Tramway Co., Peking, by Mr. Chu Chi-chien.
Chinese Citizens' Commercial and Savings Bank, by Mr. Sze Lien-yuan.

Registration of New Corporations.—According to latest report, the following corporations have been officially registered with the ministry of agriculture and commerce :—

Kung Lee Coal Mining Co., established by Mr. Feng Kung-doo.
Yue Tung Coal Mining Co., in Shantung, established by Mr. Lee Hai-kwan.
Tseng Nih Licorice Co., Peking.
Dah Dung Trading Co., established by Mr. Sze Chi-tai.

EDUCATION

Chinese Technical University.—The Chiaotung (communications) University has been formally opened. This new institution will unify and improve the technical education that has been afforded in the past by the Railway Administration College, the Postal and Telegraph College, and the Shanghai and Tangshan Colleges.

ELECTRICITY

Electric Light Plant, Chinghai.—A new electric light plant is being organized at Chinghai, Chekiang, by Mr. Wang Ying-kwan with a capital of $50,000.

Electric Light Plant, Sing-Dung-Ching.—Messrs. Chen Bai-chen, Chu Ching-mo, Kiang Yung-sze and Chen Foo-kang are organizing the Tseng Sing Electric Light Plant and the Tseng Sing Rice Husking Co. with a capital of $25,000.

Electric Light Plant, Sung-Chiar-Tan.—The Pang Yih Electric Light Plant at Sung-chiar-tan, Manchuria, is doing a very profitable business, stimulated by the recent prosperity of the town. In last spring there were more than 7,000 lamps installed which have increased. To meet with the increasing demand the plant has recently placed an order for a large quantity of electrical supplies.

A New Electrical Venture.—Messrs. Tsao Yu-iin and Chang Tsung-hsiang and other former officials have organized a company, with a capital of $1,500,000, divided into 3,000 shares to manufacture electrical supplies.

Electric Plants in China.—Up to only a few years ago artificial light in China for the purpose of illumination was supplied by the use of candles and oil lamps. The glow of electric incandescence has since penetrated all parts of the country, and to-day there are electric light plants helping to dissipate the mist of night in at least two hundred cities in the eighteen provinces of China proper. These plants are being taxed beyond their capacity and are in need of additional equipment, for the Chinese people are awake to the great value and convenience of electric power. Manufacturers of electrical goods will do well to give more thought and attention to the Chinese market for their products.

An Electrical and Engineering Co. Established in Yangchow.—Mr. Feng Tze-chung is organizing the Wai Kong Electrical and Engineering Co. at Tu-tze-char, Yangchow, where there prevails a great need for electric supplies and engineering tools. The company has been duly registered with the ministry of agriculture and commerce and will be opened for business soon.

Import of Electrical Supplies to China.—In 1920 the total importation of electrical tools and supplies to Shanghai amounted to Tls. 6,200,000, of which Tls. 2,624, 324 represented Japanese goods, Tls. 2,012,397 American goods, Tls. 1,000,-000 British goods and about Tls. 300,000 each represented Hongkong and Canadian manufactures. For the same year, their import to Canton stood at about Tls. 200,000, to Tientsin at 959,000, to Tsingtao at 160,000 and to Hankow at 38,000; while to Dairen at 1,578,777 which indicated a decrease of Tls. 100,000 as against the previous year.

In this connection, it must be remembered that in 1900 the import of these articles to Shanghai amounted only to Tls. 28,216 and in 1890 the total import to China only to Tls. 20,000, while in 1880 there was no such importation to China at all. The above figures show the rapid progress in China's electrical activities.

New Electrical Fan Invented by Chinese.—Mr. Woo Teh-shai, graduate of the Central Technical College, Japan, has invented a new type 6-lb. electrical fan, 8-in. in height. A special feature of the new invention is that it revolves about 300 times more than a foreign machine does in every minute, while consuming equal quantity of electric power. The machine has been examined and certified by the Shanghai Industrial and Commercial Society and an application to the ministry of agriculture and commerce for registration will be made.

Two Electric Light Plants being Organized.—Applications to the ministries of communications and agriculture and commerce have been made by Mr. Hsu Tze-zing and Mr. Dao Chen-foo respectively for organizing an electric light plant at Sun-fong, Chihli, and Ya-chen, Kiangsu.

Westinghouse Gets Japanese Order.—The Westinghouse Electric International Company recently announced that it has received an order for two electric freight locomotives from the imperial government of Japan, to be used in the Tokio district. These locomotives, which will weigh sixty-three tons and have a capacity of 1,000 horse-power each, will operate on the 1,500 volt direct-current system.

ENGINEERING

A New Machine Invented by Chinese.—Mr. Chang Hua-shai, manager of Hua-kee Match-Stick Factory, Tangshan, has invented a new machine for manufacturing match sticks and match boxes. The new invention has been submitted to ministry of agriculture and commerce with a request that a patent be granted.

Engineering Works, Peking.—Messrs. Wu Zung-shih and Woo Shao-pang are establishing the Shun Nih Engineering Works in Peking to manufacture nails and machineries. A capital of $150,000 has been raised and a lot of land covering 24 *mow* has been purchased.

EXPORTS

China's Trade with Germany.—In August, 1921, the following goods were exported to Germany from this country :—

Sesamum seed	16,350	piculs
Peanut	4,100	,,
Raw hides	2,088	,,
Fur	7,716	piculs
White and yellow of eggs	3,843	,,
Antimony	1,344	,,
Sheep's wool	114	,,
Red tea	314	,,
Human hair	4	,,

Export of China's Hides.—In last August, the export of sheepskin from China amounted to 105,871 pieces as against 50,922 for the corresponding month last year. For the whole year of 1920, its export stood at H.K. Tls. 8,112,526 covering 9,966,633 pieces of sheepskin, of which 857,031 were shipped to U.S., 10,800 to Italy and 3,000 to Japan.

For the period from July 1, 1920, to August 30, 1921, 1,184 piculs of cows' hides were exported to Japan from China, 3,517 to U.S. (?), 2,658 to Germany, 641 to Italy, 997 to U.S. (?), 353 to Copenhagen and 1,425 to the other principal ports in Europe and America.

August Export From China.—During these past few years China's export of ducks and geese feathers has always amounted to something more than Tls. 1,000,000, a large proportion of which were exported from the ports of Shanghai and Wuhu. As to the area of consumption, about 15 per cent. has been distributed to England, 10 per cent. to Holland, 30 per cent. to U.S. and two-fifths to Hongkong. In August 1921 exports stood at 1,,296 piculs, distributed os follows :

England	595	piculs
Holland	101	,,
Germany	114	,,
U.S.A.	437	,,
Japan	49	,,
	1,296	piculs

During the same month, the export of raveled silk amounted to 9,089 piculs, details as follows:

Marseilles	5,324	piculs
U.S.A.	1,994	,,
Japan	996	,,
London	605	,,
Italy	174	,,
Liverpool	36	,,
	9,029	piculs

COMMERCIAL FINANCE

Mining Bank being Organized.—It is reported that a mining bank with an object to give financial assistance to mining industry is being organized with a capital of $600,000 by Mr. Chao Wen-ping, a leading merchant in Dah-yue-hsien, Kiangsi.

A Large Exchange being Organized. Hankow.—It is reported that an international exchange to be jointly managed by Chinese and Japanese is being organized in Hankow. The new company will be capitalized at $20,000,000 and will transact stock and produce exchange and import and export business.

A New Bank being Organized, Shanghai.—Several Ningpo merchants such as Messrs. Hung Ching-shan, Chien Tze-chen and Hung Dyau-chen are establishing the Co-operative Bank for the People in Shanghai with a capital of $500,000.

A New Tientsin Exchange.—The Tientsin Produce and Stock Exchange held a splendid opening ceremony recently, with a large number of Japanese, Chinese officials and private persons present.

GOVERNMENT FINANCE

The French Loan still Unsettled.—The Peking *Yishihpao* says that in connection with the $3,000,000 loan from the Banque d'Indo-Chine, the matter is still unsettled because the French leaders demand reliable security which has not been pledged for other foreign loans by the ministry of finance.

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Loan for Chinese Eastern Railway.—The Chinese banking group is negotiating with General Sung Hsiao-lien, director-general of the Chinese Eastern Railway, for a loan of $35,000,000 to be used for the reorganization of the Chinese Eastern Railway. The loan is said to bear twelve per cent. interest, and it will be secured by the proceeds of the railway, but contrary to the usual custom, no discount will be charged. The Chinese banks are also reported to have declared that if this sum does not prove sufficient for the reorganization work they will be able to finance another loan to the railway.

The Hankow Port Loan.—With reference to the loan for the construction of a commercial port at Hankow, Tang Hsiang-ming, who is now on a visit to Peking, as a result of negotiations with the central government, has cancelled the loan with Samuel & Company and has, it is reported, concluded a new loan with a French merchant.—*Eastern News Agency.*

Summary of Latest Government Loans.—Reports from a reliable source state that a loan of $400,000 was signed between the Peking government and the bank of agriculture and commerce just before the Chinese mid-autumn festival, after which $500,000 from Tung Lu Bank and $40,000 from another bank were borrowed. Besides a number of foreign loans in the course of discussion, there are more than twenty domestic loans under negotiation at present, the amounts of which range from $60,000 to $500,000 with an average interest of about 20 per cent.

Proposed Aerial Loan Reported.—It is reported that Mr. Pan Ju-ying, chief of the aeronautical department, is negotiating a loan with the Vickers Co. of England of £20,000,000 sterling, to be devoted to establishing an aeronautical factory in Peking. Mr. Pan is anxious to get a small loan of £200,000 first from the company in order to relieve the pecuniary difficulty of the department.

FISHERIES

Exporting Canned Salmon.—According to a report received from Tokio, the salmon fishing along the eastern coast of Kamchatka, which was started on June 7, proved very satisfactory. The catch made by the Japan-Russia Fishing Company and the Tsutsumi Shokai during the month of June amounted to about 160,000 cases. Of this amount 124,000 cases of beni sake (a kind of salmon) and 5,200 cases of king salmon were exported in tinned form, while the remainder were exported raw. Compared with the same period of last year the figures represent an increase of about 40,000 cases. It is also reported that crabs now being tinned on the western coast of Kamchatka for export will reach about 6,000 cases.

FORESTRY

Lumber in Kirin and Heilungkiang,—Within the provinces of Kirin and Heilungkiang are scattered dense forests, and General Sun Li-chen and General Woo Tsing-sun, tuchuns of Kirin and Heilungkiang respectively, will exploit these resources. To this end an investigation is being made now by the forestry departments of Kirin and Heilungkiang.

GENERAL

Hongkong Enterprise.—Negotiations are progressing between the Hongkong Hotel Co., Ltd., the Dairy Farm, Ice and Cold Storage Co., Ltd., and the Wiseman Café, Ltd., with a view to securing a unification of interests.

New Corporations Under Organization.—According to report, the following companies are being organized :—

Fu Sing Electric Light Plant, Chen-shih, Kiangsu, by Mr. Feng Ngao.
The Citizens' Savings Bank of China by Mr. Sze Lien-yuan.
Yah Shun Steam Launch Navigation Co.
Ting Foong Co., by Mr. Wang Kan.
Lustring Manufacturing Co., Shanghai, by Mr. Yang Shao-cheun.

Registration of New Corporations.—It is officially reported that the Yah Yih Cotton Co., Tientsin, was recently registered with the ministry of agriculture and commerce.

Carlowitz & Co. Back on Old Field.—The first German firm of importance which has resumed its business with the Chinese after the war is the well-known firm of Carlowitz & Company in Canton. With the co-operation of its Chinese friends, this German firm has already received many orders for machinery, etc., from Germany to be delivered next spring. The Carlowitz houses in Tientsin and Shanghai will also be reopened shortly because their Cantonese compradores are going to rejoin their firms now. The Chinese business men are said to welcome the presence of the Germans in Canton so that it is expected that the energetic Teuton will regain his former ocmmercial prosperity in China within the course of the next few years.

German Views on China Business.—China is now passing through a period of transition from a purely agricultural to an industrial country, and for many years to come is likely to prove a good market for all kinds of machinery. In 1913 the imports of these goods were valued at Tls. 4,600,000, while in 1920 they had increased to 22,300,000.

Electrical plant is very much in request .As far back as 1911 towns of no more than 30,000 inhabitants in Southern China were fitted out with electrical plant, and developments in this direction have increased steadily.

Imports of aniline dyes have increased by Tls. 7,700,000, compared with 1913 figures, and Germany will, to all appearances, reconquer this market.

There is a great demand for rolling stock, imports of which were completely stopped during the war. The construction of railway lines does not appear to be in full swing yet.

China should be a promising market for beers and spirits. The Chinese have even embarked on viticulture at Chefoo and Peking.

The British flag again heads the list with regard to shipping. Out of a total tonnage of 104 millions entering Chinese harbors Great Britain leads with 40 million tons, Japan following with 28 million tons.—*Frankfurter Zeitung.*

INDUSTRIAL

The Otari Cement Company Ltd. was established recently at Otari, Iwate prefecture, with a capital of Y.2,000,000.

A 70 Million Yen Mill.—Rumours of a colossal undertaking by a Japanese firm are reported in the vernacular newspaper. It is stated that a certain Japanese firm has raised 70 million yen for the establishment of a spinning mill in Shanghai for the manufacture of cotton, yarn, thread, piece goods silk and woollen goods, etc. The mill will require 1,000 *mow* of land and will employ 30,000 workmen.

White Phosphorus Matches in Japan.—The board of trade have received translation of a law (No. 6) recently passed by the Japanese diet which prohibits the manufacture, sale, importation and transport of matches containing yellow (white) phosphorus. The Law is to take effect on July 1, 1922, but a further period of twelve months from that date will be allowed for the disposal of sulphur matches made, imported or transported from one part of Japanese territory to another prior to the enforcement of the Law.

More Chinese Enterprise, Hongkong.—The On Lok Yuen Restaurant, which was recently incorporated into a public company, will shortly include amongst its activities the business of a confectioner, biscuit maker and manufacturer of ice, according to an announcement made to a representative of the *Telegraph* recently. A large factory, three storeys in height, will be built on a site recently acquired at Watson Street, Causeway Bay, the cost being estimated at a sum closely approaching $100,000. Mr. Cheong Kat Shing, manager of the company, who has gone to America to make arrangements for the shipment of the machinery, is expected to return to colony early next month, when it is expected that the erection of the factory will be commenced without delay. The factory when completed, will be a welcome departure from the usual drab type of such buildings, as it will possess an ornamental exterior appearance. Messrs. Palmer and Turner are the architects.

Paper Mill Machinery.—The paper manufacturing industry in China has not yet been developed to the extent which would render it unnecessary for her to import annually the vast quantity of all kinds of paper from foreign countries, especially from Japan. The development of her other industries along modern lines makes it imperative that China should also give more thought to facilities for the production of paper of every description, more particularly those for the milling of corrugated and newsprint varieties. There are, of course, modern paper mills in China, and they are doing a prosperous business. Take the small cardboard factory in Soochow, for instance; according to a report recently brought to our attention, the Soochow factory is producing about twelve tons of cardboard each day and realizing a monthly net profit of about $20,000. There is no sustained effort on the part of American manufacturers of paper milling machinery to create a market for their goods in China. But that a demand exists or should exist is to be inferred from the fact that millions of dollars worth of the finished products of paper milling machinery are imported into China each year.

New Cotton Mill for Japan.—It is announced that a new cotton mill, capitalized at $2,000,000, is about to be constructed in one of the outlying districts of Canton. The principal object of the new concern is to manufacture native goods for Chinese consumption.

Extension of Yu Chung Cotton Mill.—At the last shareholders' meeting of the Yu Chung Cotton Spinning and Weaving Factory, Wuhu, it was unanimously decided to install an additional equipment of 5,000 spindles, costing about $273,000, build a warehouse costing $60,000, purchase some additional machinery costing $47,000 and increase its capital from $800,000 to $1,000,000.

A Sino-Foreign Paper Mill.—It is reported that some native merchants have associated themselves with several American and British capitalists in the organization of a large paper mill in North Manchuria with a capital of $2,000,000.

Match Factory under Organization, Yinkow (Newchwang).—A match factory is being established at Yinkow by Mr. Chang Ju-chen and several others. A site for the factory building has been chosen in the neighborhood of Dai-chartung and a capital of $500,000 is being collected.

Enamel Ware Manufacturing Co., Shantung.—Two returned students, Mr. Li Wai-shuan and Mr. Chang Hung chuan are organizing an enamel ware manufacturing company at Tsinan, Shantung, with a capital of $100,000.

Chinese Yarn Holder Factory.—The China First Cylindric Yarn Holder Manufacturing Co., recently established at Chapei, Shanghai, is meeting with success. The holders, made of Chekiang hardwoood, are far superior to those of foreign manufacture.

First Factory in Hu-tze Chekiang.—A certain Mr. Chu is organizing the Yu Yuan Cloth Weaving Factory at Hu-tze, Chekiang, with a capital of $50,000, the organization being the first of any industrial plant ever established in the city.

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Concrete reinforcing bars, triangle mesh, expanded metal
Plumbing, heating and wiring devices
Steel sash, steel casements, vault doors
Ice-making plants

GENERAL IMPORTERS AND EXPORTERS

New Flour Mill, Tsinan.—Hua King Flour Mill is being organized at Tsinan by Mr. Chang Tsanchen with a capital of $400,000, half paid up, and its registration has been officially made with the ministry of agriculture and commerce.

Largest Factory in Shanghai.—It is reported that several Japanese capitalists are establishing a gigantic factory, perhaps the largest in Shanghai, at E-chow-dong, Woosung, with a capital of Y. 70,000,000. The whole factory will occupy a site of about 1,000 *mow* while for the time being buildings covering 300 *mow* have been in the course of construction. This industrial plant, when completed, will employ 30,000 employees, and its activities are to cover cotton and silk spinning, weaving and dyeing, while an extensive scheme for building up a market adjoining the factory is also being planned.

A Large Lace Company Established, Chekiang.—The Sino-American Lace Co. has been established at Ling-ngan-shang, Chin-hai, by an American capitalist, Mr. Harmet (translated according to pronunciation of Chinese characters), with a native merchant, Mr. Wang Yih-sun. The company has a capital of $10,000 under Sino-American management, Mr. Wang acting as compradore.

Extension of Yung Lee Alkali Manufacturing Co.—At the last shareholders' meeting of the Yung Lee Alkali Manufacturing Co., Tientsin, it was decided to increase its capital by $600,000 in order to enable the factory to increase its producing capacity.

Soap Factory, Chinkiang.—The Tseng Hua Soap Manufacturing Co. is being organized at Chinkiang by Mr. King. When the new company opens, Chinkiang will have six soap factories.

Registration of Cotton Spinning and Weaving Factory.—It is officially reported that the Tseng Tai Cotton Spinning and Weaving Factory, Shanghai, which was promoted by Mr. Lee Paipao with a capital of $800,000, has been duly registered with the ministry of agriculture and commerce.

Silk Textile Plant Opened, Chinkiang.—The Chen Chong Silk Textile Plant has been established at Chinkiang by Mr. Loh Sho-pu, a wealthy merchant in the city. The new plant is operated by about 60 men and 30 women laborers with 44 weaving machines, and three times as many workers as at present will be employed when another 100 machines have been completely installed. It occupies a site of over 20 *mow* and is capitalized at $120,000.

New Cotton Mills for Tientsin.—Cotton mills seems to be in fashion in Tientsin nowadays; one is in the course of construction that will contain 56,000 spindles when completed.

Several others are also under construction so that in a few years time much manufacture of cotton goods may be expected to be done in this neighborhood.

While the militarists continue to squabble and bleed the government the more peaceful people, the merchants, are quietly going ahead with their schemes for development.

Investment by Java Merchant.—Uy Yik-chu, a well known sugar merchant in Java, is planning to start a large cotton mill in Shanghai and a silk factory in Chekiang, a tea factory in Fukien and a sugar mill in Canton with a capital of $40,000,000, according to the *Manila Daily Bulletin*. Mr. Uy has lately established a Chinese bank in Shaughai and is one of the large stockholders in the China Banking Corporation in Manila.

Extension of Heng Doh Cotton Mill.—The Heng Dah Cotton Spinning and Weaving Factory, Yang-sze-hsiang, has announced the increase of its capital by $300,000 and the installation of 5,000 additional spindles.

Mukden Cotton Mill Expands.—Finding its present premises too small, the Cotton Spinning and Weaving Factory at Shiao-si-pai-men, Mukden, is planning to get a new site of 100 *mow* near the Peking-Mukden railway station.

Industrial Plants, Chekiang.—According to a report prepared by the industrial commissioner at Hangchow, there are in Chekiang about 2,500 factories, 218 silk textile plants, 1,800 silk textiles companies and 6,718 weaving works, aggregating a total capital of $64,750,000 with over 146,000 staff and workmen.

Cement Plant, Wusieh.—The Tai-hu Cement Company is being organized at Wusieh by Messrs Yih Kung-tao, Sih Nan-ming, Chao Kien-chun, Chen Tseng-tsan and Liu Yue-chang. The new company has been officially registered with the ministry of agriculture and commerce, capitalized at $2,500,000 in 50,000 shares of $50 each.

Sugar Refinery Planned, Mukden.—It is reported that some Chinese merchants are planning the establishment of a sugar refinery in Mukden with a view to competing with the South Manchuria Sugar Manufacturing Co., organized by Japanese.

New Cotton Mill, Hsuchow.—The Zung Shih Cotton Spinning Mill is being organized by Mr. Liu Soong-ngai at Hsuchow, where there is a yearly yield of millions of catties of cotton that can be utilized for yarn. The new mill is to be capitalized at $100,000.

Silk Weaving Plant, Shantung.—Mr. Wang Shou-chen is organizing the Lih Chong Silk Mill at Lung-shan-ching, Shantung, with a capital of $100,000. The new factory is to be equipped along the same lines as the Yue Woo silk textile plant of Hangchow.

Hosiery Factories in Canton.—It is reported that there are no fever than 50 silk hosiery factories in Canton. Most of them employ 30 to 50 workers; while the larger ones employ more than 100 workers. Women and girls form the larger number of employees in these factories. Most of whom earn 60 cents to $1 a day.

Ice Factory : Canton.—Another ice factory is projected for the French Concession, Shameen. This factory claims that it can manufacture 1,200-lb. of ice in an hour the same output as that of the Chinese Ice Factory. The building will be completed soon, and machinery ready for operation in a few months.

Japanesc Spinning Mill, Shanghai.—It is reported that a Japanese firm has raised 70 million yen for the establishment of a spinning mill in Shanghai for the manufacture of cotton, yarn, thread, piece goods, silk and woollen goods, etc. The mill will require 1,000 *mow* of land and employ 30,000 workmen.

New Soap Works, Chefoo.—A new company under the name of "Yuah Chen Tai Soap Manufacturing Co." is to be established in Chefoo. Its capital is $50,000.

New Chinese Machinery Co.—The Ching Hsin Iron Works of Hsuchow organized by New Ziang-ting was opened recently. It manufactures weaving machines, cotton gins and printing machines.

Chemical Factory, Tsinan.—A factory is to be established at Tsinan for the manufacture of sulphuric and nitric acids.

Chinese Patents.—Chen Hsiang-yuan, of the Chung Chung Hwa Domestic Industrial Co., Ltd., has petitioned the ministry of agriculture and commerce for monopoly rights of the company's invention of a process of manufacturing magnesium carbonate from wastes. The application has been granted.

Tyres made in the F.M.S.—Messrs. Mace, Hall & Co. are making motor car and bicycle tyres at Ipoh, beginning with the Ford size.

The Commercial Port of Hai-chow.—Mr. Chao Chang-yung, a gentleman of Hai-chow, has requested the ministries of agriculture and commerce and communications that a waterworks company and an electric light plant should be authorized for operation by the Hai-chow port work bureau, and the proposal has been sanctioned by the authorities concerned.

Egg Products Co. Established, Shanghai.—The Fu Ling Egg Products Manufacturing Co. has been opened in Shanghai with a capital of $40,000. The principal of the new company is Mr. Chen Kuo-ping, a Cantonese merchant, and application for registration has been made to the Shanghai magistrate.

North-West Industrial Trading Co. Being Organized.—The Si-Pei or North-West Industrial Trading Co. is being organized in Peking by some Chinese and American interests. The company was promoted by Mr. Har Han-chong and General Ma Fu-hsiang and General Li Yuan-heng, former president of China, are said to have associated themselves with the undertaking. A certain foreigner is also participating in the enterprise by investing $5,000,000 and on the part of Chinese capitalists a same amount has been subscribed.

Some Important Factories in Nantungchow.—The following brief account of some important factories in Nantungchow may be of interest to those who have a mind to know the present industries in the model city of China. Among all the plants and mills in the city the largest is the Dah Sung Cotton Spinning and Weaving Factory which is capitalized at Tls. 2,500,000. At present it is equipped with 65,380 spindles and 480 loooms with an annual production of 47,000 bales of yarn and 130,000 pieces of cloth. The average consumption of native and American cotton every year amounts to approximately 170,000 piculs. During last year, a net profit of about Tls. 2,000,000 was made and an extension work of the factory is being planned at present. A textile plant bearing the same name as the cotton mill was established in 1915 with a capital of $22,000. It has 60 weaving machines and produces 80,000 woolen blankets annually.

The Foo Sing Flour Mill situated at Tang-za, which turns out about 650,000 bags of flour yearly, is doing a good business. A net profit of $130,000 was reported to have been made last year.

The Tung Sui Match Factory which is located at Tien-Sun-Kung is also worth mentioning. It was founded last spring with a capital of $200,000 and its products bearing the different brands of "Nantung," "Soldier" and "Wu-foo" have enjoyed a ready sale throughout China.

An oil mill known as Kwong Sung is also doing a very profitable business every year and has many branches established outports. The principal products of the mill are bean oil and cotton oil, the latter being comparatively inferior in quantity. With a view to improving the second-class products, an experienced German chemist has been employed and a good success in the work is reported to have been made.

MACHINERY

Chinese Machinery Co., Canton.—The Ching Hsin Iron Works of Hsuchow organized by New Ziangting was opened recently. It manufactures weaving machines, cotton gins and printing machines.

MINING

Coal Mining to Shantung.—The bureau of economic information says: It is reported in the vernacular press that the coal mine at Tzechuan (Yutingchen) Shantung, is to be operated by Sino-Japanese enterprise with a capital of $6,000,000, which has been equally subscribed by the Shantung provincial government and various Japanese firms. The mine has an area of about 600 *li*, and is reputed to possess rich seams. These are 7-ft. 5-in. in width, and run in parallel lines in 24 layers. The output, if properly worked, is capable of supplying all the needs of the province.

A New Mine in Kiangsu.—It is reported that an aluminium mine has been discovered at Haichow, Kiangsu.

A Coal Mining Co. being Organized, Shantung.—Mr. Chen Sze-chee is organizing a coal mine company at Chee-chow, Shantung, with a capital of 200,000 to operate on the coal deposit at Lung-tan, Sing-tai-hsien, which has been proved to be quite plentiful and fine in quality.

Mihshan Coal Mine, Kirin.—The civil governor of Kirin has notified the ministry of agriculture and commerce that the merchants of the province propose to open the Mih Shan coal mines, and asks for its approval.

Coal Mine, Manchuria.—Mr: Koo Van-ching has been authorized by the industrial commissioner of Kirin to operate the coal mine at Ma-ping-kew of Peng-chee, Manchuria. He is supported by Mr. Chao Tsing-shan, who has promised to invest $20,000 in the undertaking.

New Mining Company, Mukden.—A Sino-Japanese corporation known as the "North-Eastern Company" in Fengtien has been established with a capital of Y.20,000,000 for mining, afforestation and agricultural enterprises.

New Discovery of Coal Mine, Shantung.—It is reported that a new coal mine has been recently discovered at Chiang-chun-ker, Pao-shan. Its quality is well spoken of, and a certain Mr. Chang has been authorized to develop the new property by order of the ministry of agriculture and commerce.

Mines to be Developed.—By order of the ministry of agriculture and commerce, Mr. Sui Nan-ping has been permitted to operate the coal mine at Yue-shu-chuen in Yen-chang, Kirin, and Mr. Chow Kai-chen to operate the gold mine in front of Yue hill, Tung-hai-hsien.

Opening of Mineral Resources Permitted.—By order of the ministry of agriculture and commerce, the following mines are granted to operate :—

Mine	Location	Area	Mining Merchant
Coal	Shih-chai-ling & Mai-lung-kong in Nan-ling-hsien, Anhwei	570 mow	Fong Ting-ying
Coal	Tung-tao-chung in Fan-chang-hsien, Anhwei	—	Yao Shu-yue
Coal	Char-char-tsu in Dahtung, Shansi	—	Hsu Shih-yu
Coal	Pei-chuan-dee in Tsing-chen, Shansi	—	Hur Dong-foong
Coal	Soo-chong in Tsing-chen, Shansi ...	—	Van Tseng-sung

Yenki Rich In Minerals.—Yenki, in Kirin, China, possesses rich mineral resources, particularly gold and silver, say advices from Peking. The silver mine in Tienpaoshan was first operated by a Honanese, but the enterprise failed and the Japanese gained control through negotiation of a loan of $60,000. Effort was made by the Chinese to regain possession, but the Japanese demanded $3,000,000 compensation. Eventually agreement was reached whereby the undertaking was operated under Sino-Japanese auspices. The value of the daily silver output is reported by the Japanese to be $30,000.

The gold mines in the Yenki district are worked by the Chinese. Owing to the primitive methods employed and the small capital, there is plenty of opportunity for development. Recently a mining association known as the southeastern industrial association was established. It intended to begin development on a large scale.

Extension of Anshan Mining Zone.—The Chenhsing Mining Co., Anshan, under Sino-Japanese management, applied to the agriculture and commerce office, Peking, for the enlargement of the Anshan mining zone by some 93 square miles in the district adjoining Yingtaoyuan mine. A formal sanction has been recently granted.

Nickel in Yunnan.—In Yunnan nickel ores consisting of galenas, pyrites and kupfer nickel, occurring in the gueiss, slate and quartz rock of sourth-eastern Yunnan have been seen, and sent to London for assay purposes, but no workings of this metal exist in the region.

Certain galenas assayed from the Tungchwan region have been found to contain a small percentage of nickel. Associated with cobalt, the metal seems to exist in ores sent in for examination from the Red River district, to the west of Kochiu, but in none of these regions is any mining going on at the present time.

Japanese coal shipped abroad during 1920 amounted to 3,300,000 tons, including 2,300,000 tons shipped by steamers and 1,000,000 tons loaded as bunker.

Chang Shun Coal Mining Co. to Increase its Capital.—The Chang Shun Coal Mining Co., Huchow, Chekiang, has announced the increase of its capital from $2,200,000 to $3,300,000; the new capital is to be used for the extension of mining areas and purchase of additional machinery.

Operation of Mines Granted.—The ministry of agriculture and commerce has recently authorized the following mining merchants to operate the mineral resources of which they applied for development :—

Mr. Wang Jen-wen to open the coal mine at Lien-Char-shan in Ling-yue, Chihli.
Mr. Chow Chao-pei to open the coal mine at Feng-char-chong in Ping-ding, Shansi.

Iron Ore in Malaya.—An iron mine has been opened in the district of Batu Pahat, Johore, and 5,000 tons of ore are being turned out monthly. The ore is shipped to Japan; but there are signs of coal in the same district, and there are hopes that pig-iron may eventually be produced on the spot.

NEW COMPANIES

New Companies.—The following companies are being organized :—

Pei Li Coal Mining Co., Chihli.
Chen Pao Spinning and Weaving Mill, No. 3, Chihli.
Industrial Bank of Eastern China, Fengtien, by Mr. Wang Kien-jih.
Hung Shun Flour Mill, Tsinan.

New Corporations.—The following corporations have been officially registered with the ministry of agriculture and commerce :—

Pawn Trade Bank, Soochow, Kiangsu.
Yah Shun Steam Launch Navigation Co.
Sin Chen Lard Manufacturing Co., Ltd.

OIL

China's Petroleum Wells.—A recent investigation shows that China possesses petroleum wells in the following provinces :—

Chihli	22
Kirin	2
Yunnan	17
Kiangsu	5
Hunan	4
Szechuan	3
Kwangtung	1
Fengtien	4
Kweichow	13
Shensi	8
Kwangsi	4
Kiangsi	4
Hupeh	2

The total throughout the country is 91 wells, the best of which are in Chihli, Kweichow, Yunnan and Szechuan.—*The Chinese Engineer and Contractor* (*Chinese*).

Chinese Oil Discovery.—Reports of the discovery of an amazingly rich field of oil, including many gushers, and a quantity of natural gas in Southern China, have been received by the department of commerce. A recent article in the conservative London *Financier*, also forwarded to the department, speaks in glowing terms of the value of the new oil find.

Oil in Sarawak.—Large quantities of oil of good quality are reported to have been discovered in Sarawak, where the Anglo-Saxon Petroleum Company has been prospecting for a considerable time.

A. P. C. Sells Fuel Oil to Japanese Government.—The Asiatic Petroleum Co. (British) has recently completed a contract (through the Rising Sun Petroleum Co.) to furnish the Japanese government with 200,000 tons of fuel oil. When this contract is fulfilled the existing tanks of the Japanese government will be filled to capacity.

PUBLIC WORKS

Canton Planning Committee.—The city of Canton recently formed a planting commission, under the department of public works, for the purpose of studying and preparing a program of municipal improvement. The commission consists of nine members with the commissioner of public work as chairman. The other members are the three divisional chiefs and two other engineers of the public work department. Besides, there are three foreign engineers invited by the mayor to become honorary members of the commission. This commission is chiefly of a technical nature.

RAILWAYS

Light Railway Extension, Kirin.—It is reported that the Tien Doo Light Railway Co., Kirin, operated under Sino-Japanese management, has recently increased its capital and established branches at Lung-tsing-ching and Loh-dao-kew in Yen-ki.

Harbin-Heiho Railway.—It is reported that General Chang Tso-lin favors the construction of a railway from Harbin to Heiho and that General Woo Tsing-sun, tuchun of Heilungkiang, the promoter of the scheme, is appropriating funds to carry out the work.

Electric Locomotives for Japan.—The Westinghouse Electric International Co. has received from the imperial government railways of Japan an order for two electric freight locomotives. These locomotives will weigh 62 tons and have a capacity of 1,000 h.p. each, will operate on the 1,500-volt direct current system.

Shanghai-Hangchow-Ningpo Railway.—The *Sinwanpao* reports :—The Shanghai-Hangchow-Ningpo Railway is asking the British Corporation to allow the railway to have a loan for the repairing of Tsao-Wo-Kiang Railway bridge and the construction of a railway between Shaohsin and Tsaowo, offering the railway income of the line as security.

Extension Work on Peking-Suiyuan Railway.—The Peking-Suiyuan Railway Administration is contemplating the extension of car sheds at Nan-kow, Kong-chong and Ping-dee-chien and the building of lodging quarters at Ping-dee-chien for railway staffs which are estimated at about $167,500 in total. It is stated that the plan has been favorably received by the ministry of communications.

New Structure on Peking-Suiyuan Railway.—It is reported that the Peking-Suiyuan Railway Administration is contemplating the establishment of a signal station at Ning-yuan.

Joint Transportation Conference of Domestic Railway.—The 10th session of the China's railways joint transportation conference will be held in the ministry of communications, Peking, at 10 a.m. on Oct. 12, ond a circular letter has been dispatched to the various railways which have joined the conference, notifying them of the date and place. The Kirin-Changchun, Szepingchar-Taonan, Chengting-Taiyuan, Chuchow-Pinghsiang and Canton-Hankow railways are also invited to send delegates to attend the meeting.

The Tokyo Underground Railway Co. Ltd., has decided to increase its capital to Y.80,000,000 from Y.10,000,000. A new route will be built between Shinogawa and Uyeno.

Buy Locomotives, Pay in Goods, are Terms Given to Russia by Baldwin.—The *Advertiser-Ledger* correspondent has learned that the Baldwin Locomotive Works is making overtures to the Soviet government to furnish locomotives to Russia on the basis of payment in commodities which would be carried out of Russia in the locomotives supplied. This would begin on a small scale, the Baldwin company maintaining control of the locomotives until the goods in payment had been delivered. The Baldwin company would act as agent in marketing the Russian goods, and the profits from this arrangement would go into the purchase of more locomotives in constantly increasing quantities, eventually restoring the Russian railway situation to normal.

American Enterprise in the Far East.—According to a telegram received, an American commercial delegation, headed by Dr. Abbot and Colonel Davis, which has been visiting Khabarovsk and the Amur district, has arrived at Chita, where negotiations have been opened with the Far Eastern Republic with regard to a concession concerning the Amur Railway. The delegation, it is stated, found in the course of its investigations that this railway had been completely demolished and that considerable sums would have to be spent on it before it could again be operated. The delegation proposed to form an American company to carry cut the necessary repairs on condition that the Chita government granted it a concession with sufficient guarantees. The message points out that Japan is also interested in the Amur Railway. —*Reuter.*

Construction of Sing-ming-Fankao Railway again Mooted.—Some time ago the talk of constructing a railway between Sing-ming and Fankao in Fengtien was taken up by the chambers of commerce of the two districts, but the scheme was dropped owing to lack of funds. According to report from Mukden, the matter has now been revived by the local gentry. The construction cost will be equally subscribed by officials and citizens, and railway materials will probably be supplied by a certain Japanese firm at Mukden.

Railway Under Construction.—Construction work has begun on the Chinchow-Chiaoyang Railway. The line starts at Chinchow on the Peking-Mukden line and extends to Chiaoyang, Inner Mongolia. The decision has been made that the new railway will be made a branch line to the Peking-Mukden line in the expenses for the construction be provided from the income of that railway.

The Paotu-Suaiyuan section of the Peking-Suaiyuan Railway is now being constructed; and it is hoped to complete it by the end of this year.

Construction of the Chunhow-Chuping section of the Canton-Hankow railway was begun on May 1st. The cost will be met by an appropriation which has been set aside from a portion of the revenues of the Peking-Hankow and other railway.

Kaifeng-Tsining Railway.—The construction of a railway from Tsi-ning in Shantung to Kai-feng in Honan which was proposed by several Chinese gentry at Tsi-ning some time ago has been approved by the ministry of communications upon conditions that no foreign money shall be invested nor can it be placed on security for any loan. The line, when completed, will measure about 700 *li* in length and will link up with the branch line Chechow-Tsining railway at its Shantung terminus.

It should be known that Tsining, being favorably located in Shantung province, is fast growing to be a prosperous industrial town and will hold a more important position in business even that Tsinan when opened as a commercial port.

Improvement Work on Peking-Suiyang Railway.—In view of the recent collision of trains which occurred at Fusun station, the Peking-Suiyuan Railway Administration is preparing to take preventive measures against any further similar incident, and has suggested to install electric signals along the whole line of 1,345 *li*, which is estimated at about $2,400,000. But as the government financial condition does not allow such an extensive scheme electric signals will be established only at important stations at a cost of about of $600,000.

RIVERS, HARBORS, WHARVES AND DOCKS

The Imperial Land Colony Co., Ltd. was organized recently with a capital of Y.30,000,000 fully paid up for the purpose of reclaiming 30,000 *chobu* of land at Ariyake Bay in Kyushu.

Pootung to Dig a River.—For the relief of the flood famine at Nan-wei and Chuen-sha, Pootung, it has been suggested that a river be dug in the famine district with the service of famine sufferers. The work will cost about $20,000 which will be probably advanced by the Chinese banks.

Plans of the Chinkiang Customs Commissioner.—The commissioner of customs at Chinkiang has suggested that a road be constructed from King

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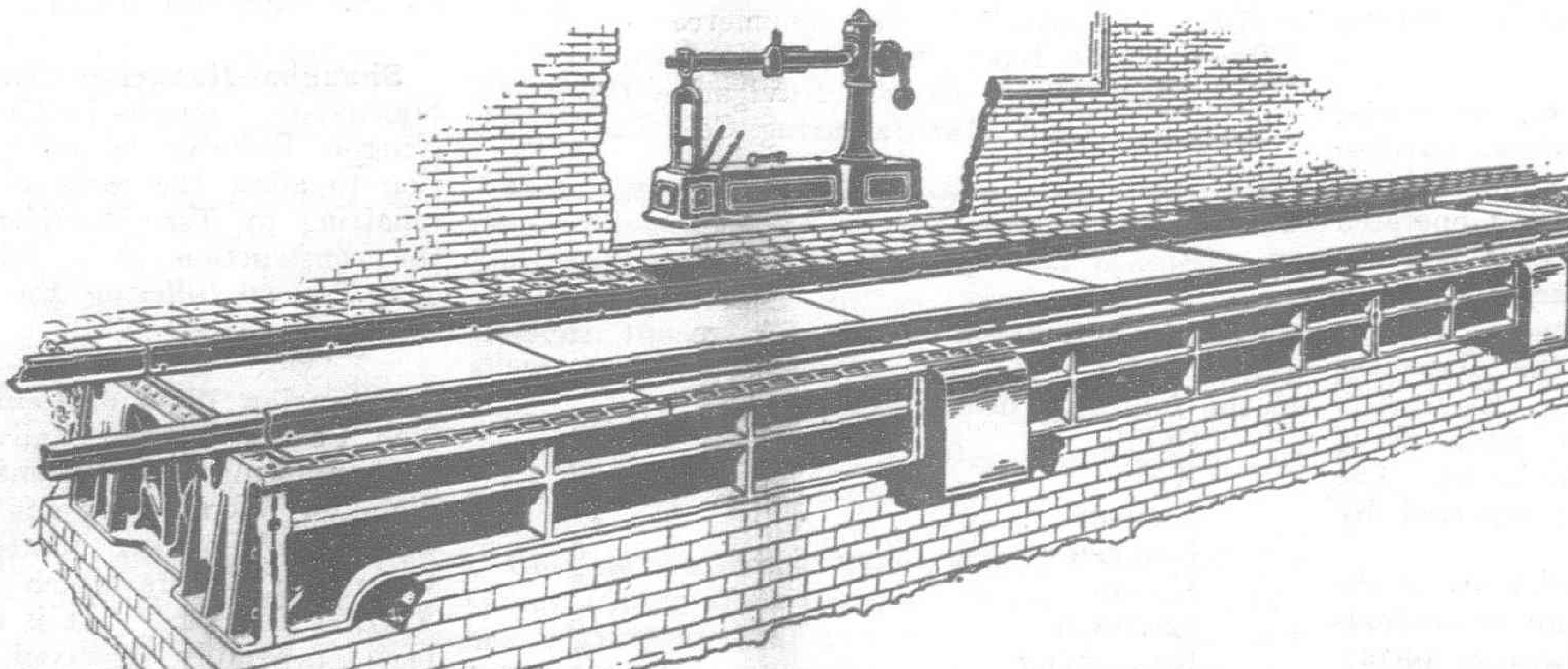

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shan to Kan-lu-tze on the beach recently extended from the Yangtze River and to dredge a stream parallel to the road so as to accommodate an anchorage to the large as well as small vessels. The commissioner is of opinion that if his proposals are adopted the prevailing business depression at Chinkiang will be greatly improved, and regarding the expenditure, he has declared that Messrs. Jardine, Matheson & Co., Chinkiang, will advance a certain amount.

Yangtze Conservancy Commission Proposed.—In view of the deterioration of the Yangtze River especially at the lower reaches which will surely result in a serious flood unless some immediate measures are taken, Mr. Chang Chien and several other conservancy experts such as Mr. Han Tze-shih and Mr. Wang Tan-kwan, under auspices of the Kiangsu civil governor, have proposed to appoint a Yangtze conservancy commission at Nantungchow in the early part of the month to go into the question of improving the river and preventing further deterioration.

Harbor Work Completed Soon: Kobe.—The first unit in the reconstruction of the harbor of Kobe which has been in progress since 1906 at an estimated cost of Y.13,000,000 is to be completed in another few months, reports an *Asahi* special from Kobe.

The features of the proposed reconstruction consist in the reclamation of land covering an area of 83,000 *tsubo* with the object of extending and increasing the number of wharves, the establishment of 18 additional warehouses and railway buildings, construction of special roads, and the increase of the depth of the harbor to 36-ft.

Upon completion of the above work in the near future, the second unit in the plan of reconstruction will be taken up, under which it is proposed to put the finishing touches on the reconstruction work at an estimated cost of Y.20,000,000.

This work will be spread over a period of 12 years.

When this work of reconstruction is all complete, the Kobe Harbor will be the best trading port in Japan.

New Bunding, Nantungchow.—The Flood Prevention Association of Nantungchow has decided to repair the embankment by extending its foundation, increasing its height and joining together the eastern and the western parts which have been separated. Around the embankment there will be spread a layer of stones to impair the violent force of floods.

Reclamation of Shan-men-wan.—The talk of bringing Shan-men-wan, Chekiang, under cultivation by reclamation was taken up about a year ago by some wealthy Chinese overseas with the support of the central government. The matter has been revived by Mr. Ling Yung-ching, a rich Chinese, who recently had an interview with the provincial authorities of Chekiang with regard to the development of the port. As an initiative step, the fishing industry, one of the richest resources of Shan-men-wan, should be placed on a sound footing, and a fishery company capitalized at $2,000,000 is being organized.

Flood Prevention Bureau.—The ministry of communications has recently established a new department to study and devise preventative measures against floods in the railway zones. The new organ is called the railway flood prevention bureau.

Grand Canal Improvements.—In view of the recent flood and famine caused by the overflow of the Grand Canal, the conservancy department of Hsu-kao, Kiangsu, has decided to build a sluice at Chow-yue, Tsan-doo, Chang-wang and Sing-sung, important points on the Canal.

Conservancy Work in Nantungchow.—In view of the terrible flood famine last summer and as a preventive measure against any similar calamity in future, the Nantungchow conservancy department has prepared to repair all the sluices and weirs in Nantungchow. A representative has been sent to ascertain the capacity of the Yung-yen-hu and speed of the water at the sluices.

ROADS

Chefoo-Weihsien Motor Road.—The construction of Chefoo-Weihsien automobile road is going on steadily; at the end of the year transportation service will be possible between Wen-hsien and Lai-chow, and in February, 1922, automobile can reach as far as Wang-hsien. An autobus service for the whole line is expected to be inaugurated in April.

Communications with Mongolia.—In a recent telegram to the government, General Chang Tso-ling proposed to build modern roads in Mongolia and suggested that delegates be sent to Jehol, Charhar and Suiyuan to make surveys.

Work of the National Road Construction Association.—With regard to the Kiangsu-Chekiang line as proposed by the National Road Construction Association, General Lu Yung-hsiang, tuchun of Chekiang, has promised to give it assistance by sending soldiers to carry out the work, while the military governor of Kiangsu, General Chi Sih-yuan, has also supported the plan and will order the military surveying department to make a survey of the line in Kiangsu. General Chi, however, has declared that the government is not responsible for the construction cost of the road.

An Automobile Road Planned.—Mr. Chen Hsu dang, citizen of Gin-hsien, has applied to the local authorities for permission to construct an automobile road from Changshan, Chekiang, to Yu-shan-hsien, Kiangsi, and the proposal is now under the consideration of the authorities concerned.

Estimated Profit on Hangchow-Yuehong Motor Road.—It it estimated that the yearly income from the Hangchow-Yuchong Autobus service, Chekiang, which will be inaugurated soon, will be about $144,000 with a yearly expenditure of $129,980, leaving a gross profit of $14,020.

Pao-Shan District Roads.—While the main line of Pao-shan district from the north to south terminus is nearing completion, the road construction department of the city is preparing to construct another main line running from the east to the west which will start from the west gate and ends at Kwang-foo in its neighboring district Chiar-ting, passing through Tso-chiar Bridge, Yang-hong and Liu-hong and having a length of about of 30 *li*.

A two-mile road will be built between Shimootoba and Yono en Nishima province, Kanagawa prefecture.

New Roads in Japan.—A new road will be built between Shimopotoba and Yono, a distance of two miles, in Kanagawa prefecture, Mishima province.

A New Road Under Contemplation.—The road construction department of Nantungchow has decided to construct a motor road at See-kiang in the western district of the city.

Ningpo-Szechee-Chinghai Motor Road, Chekiang.—Messrs. Nue Woo-teh, Chen Pai-hua, Ning Ya-kong and Shun Foo-shan have proposed the construction of a long autombile road passing through the three districts in Chekiang-Ningpo, Szechee and Chinghai, and survey of the line will be made soon. According to the proposed scheme, the main line will start from Li-char-hur-men in Ningpo, passing through Lao-doo-jao, Kuo-doo-tze, Har-poo, King-char-chin, Chu-wang, Ho-lung-shan, Lung-der-chang, Tien-tsai, Wang-sze-kung-shan and Yang-van in Chinghai, then leading to Ming-ngao-chang via Tsong-chee-jao, Zar-ju-dong-jao and Kwai-hai-wai in Szechee, and the branch line will run from Li-char-hur-men in Ningpo to Chinghai.

Narrow Paths to be Improved, Fukien.—Several citizens of Vung-tai, Fukien, who are interested in public work, are beginning the solicitation of a subscription to a certain amount for repairing and extending the narrow paths in the city.

SHIPBUILDING

New Steamer, Shanghai.—The Ping An Dockyard owned by Tung Yue & Co., is now building a steel vessel the *Singpaohua* which will be ready to launch in the coming spring. When completed, she will be placed on the service between Shanghai, Chow-shan, Haimen and Shih-poo.

Diesel Engine for Japan.—The Japanese government recently placed an order with Sulzer Bros. for Diesel engines to the value of £1,250,000, to be installed in the new submarines. The engines are to be 4,000 horse-power, and it is intended to equip each of the vessels with engines aggregating from 16,000 to 20,000 horse-power.

A New Steamer Added to the Fleet of C. M. S. N. Co.—A ocean-going vessel *Sing-hua* having a gross tonnage of 3,500 has been built in Glasgow, England, to the order of China Merchants' Steamship Navigation Co., Shanghai, for their Northern China trade. The new steamer is new detained by the British authorities and on presentation of Chinese government's passport which is now being asked for by the company she will make her first voyage to Shanghai.

A Chinese Built Ship.—The Ping An Engineering and Shipbuilding Works, Ltd., announce the launching of the steamer *Hsin Pao Hua* at their Pootung yards.

A New Blue Flunnel Steamer.—Built to the order of the Ocean Steamship Co., Ltd. (Messrs. Alfred Holt & Co.), of Liverpool, the steel screw passenger and cargo steamer *Meriones* was launched successfully on August 19 from the Hebburn yard of Palmers Shipbuilding and Iron Company, Limited. Of 10,000 tons dw. capacity, the principle dimensions of the *Meriones* are: length, 467-ft. 6-in.; breadth, 58-ft.; depth to upper depth, 35-ft. 3-in. She is of the two-deck type, with poop, bridge and forecastle, and has six holds, one of them insulated for carrying perishable goods. Her derricks have been specially arranged for the rapid handling of cargo. She will be fitted by the building firm with single-screw double-reduction geared Parsons turbines, steam being supplied by two double-ended boilers have Schmidt's superheaters and Howden' forced draught.—*Shipping and Engineering.*

SHIPPING

A Ship Launched: Shanghai.—At the Ping An Engineering and Shipbuilding Works, Ltd., recently, the str. *Hsin Pao Hua* was successfully launched. The new vessel is of the following dimensions:—Length, 189-ft. 6-in.; breadth 30-ft. 8-in.; depth, 18-ft.; speed, nine knots; three cylinders and single screw. When completed she will run between Shanghai, Wenchow, Taichow and Chapoo. The owners of the new vessel are the Toong Yue, Kiang Kee & Co.

Chinese Government Subsidy.—The Chinese government has announced that it will allow subsidy to ships of more than 4,000 tons gross, for five years according to the rate decided by the minister for communications, on condition that they must be those that have Chinese nationality. It is further stated that an additional subsidy of 5 per cent. will be granted to those ships that have been built in Chinese dockyards. The present announcement has been made with a view to developing the shipbuilding industry and marine transportation in China. It is provided also that, unless three years pass after the suspension of the granting of subsidy no ship can be sold or mortgaged to foreigners.

A New Fire Launch for Shanghai.—A steam fire launch is the latest addition to the craft under the control of the Shanghai harbor master's staff. The launch has a powerful pump of 90 pounds pressure.

New Steamer Service to China.—The Ellerman Bucknall Line on December 2 will inaugurate a passenger service from Liverpool to the Straits, China and Japan.

Chinese Shipping Expansion.—The San Pe Steam Navigation Co., Shanghai, has bought from the Chung Hua Steamship Co. the 770-ton vessel *Washington*, whose name has been changed to *Tze-Kiang*, re-built at a cost of over $10,000. She will be placed on the run from Hankow to Yochow via Changsha.

The Ningpo-Shaoshing Steamship Navigation Co. has announced an increase of its capital of $500,000, which will be used to build a large vessel for the Yangtze service. At present, it has the *Lao Ning-shao*, an old steamer, on the Yangtze, from which a yearly profit of about $100,000 is made.

Steamship Navigation Co. Established by Chinese Overseas.—It is reported that several Chinese overseas including Mr. Li and Mr. Chang have organized a steamship navigation company known as H. H. H. Erlofson with four Germn vessels purchased from Germany. These steamers named *Wang-kai*, *Chow-fah*, *An-heng* and *Marnila*, have a tonnage of 1,000 each, and the first two have sailed their first voyage from Singapore to Shanghai while the other two will visit Shanghai soon.

A New Steamship Navigation Co. Proposed.—In view of the inadequate means of communication from Shanghai to Wenchow, so far only the steamers' *Hai-yih* and *Kwang-chi* of the China Merchants Steamship Navigation Co. running between these two points, Mr. Chang, magistrate of Wenchow, and Mr. Pai Char chung, division commander at Wenchow, have proposed to establish a new steamship company for Shanghai-Wenchow service. A capital of $600,000 for the enterprise will be raised and wharves will be built at suitable places.

Ferry Service on Wbangpoo River Proposed.—Mr. Dong Shih-hung, manager of Pootung Electricity Co., has proposed to organize a steam launch navigation company for ferry service on the Whangpoo river with Chow-chiar-doo, Yang-chin-kong, Shih-loh-pu-jao, Fai-yang-chin-jao, Yangtzepoo Bridge, Nan-ma-do, Tung-chiar-doo, Loh-pai-doo, etc., as stopping places. The company will be capitalized at $100,000 and will inaugurate its service with six steam launches and eight tow-boats. A petition, together with a request for holding a patent for twenty years has been submitted to the ministry of communications for sanction.

N.Y.K. Activities.—News has been received in Shanghai that the Nippon Yusen Kaisha is shortly to have two fast passenger vessels of 5,500 tons gross each which are being built in England placed on its services between Shanghai and Japan ports. The N.Y.K. is already operating seven steamers on its Yokohama-Shanghai line (weekly) and Osaka-Kobe-Shanghai line (twice a week) but has for a long time been planning to inaugurate a fast service between this port and Japan, thereby facilitating connections between China and Japan. Each steamer will carry 360 passengers and have two classes, first and third. They will be able to develop more than 18½ knots an hour, so that the trip between Shanghai and Nagasaki, which now requires 36 hours, can be completed in about 26 hours.

New Steamship Co. Registered.—The Yah Shung Steam Launch Navigation Co., having two vessels *Yah-foong* and *Yah-cheng* to run a service in the interior of China, has been officially registered with the ministry of communications.

TELEPHONES

Telephone Between Shanghai Native City and Foreign Settlement.—It is stated that negotiations are going on between the Shanghai Chinese Telephone Co and the Shanghai Mutual Telephone Co. for a through telephone service between the native city and the settlement, and it is believed that the proposal will be carried out before long.

Shanghai Telephone Expansion.—The municipal council has decided to support the proposal of the Shanghai Mutual Telephone Company to increase its capital from Tls. 1,000,000 to Tls. 2,000,000 and will underwrite on its own behalf the proportion of new shares proposed to be allocated under the scheme.

Chinese Government Want Telegraph Supplies.—The Chinese government telegraph material supply department invites tenders for the supply of various kinds of telegraph materials. Conditions governing tenders, specifications with diagrams, requisition sheets and other particulars, may be obtained from the head office, No. 27 Markham Road, Shanghai, on payment of Mexican dollars ten, which shall not be returnable. All tenders will close on the 21st of December, 1921.

Telephone Extensions, Kiangsu.—It is planned to connect all important cities in the province by long-distance service. Connections between Shanghai and Nanking will probably be completed by the end of 1921. The total cost of the improvements now being effected in the province will amount to approximately $1,000,000 of which $425,000 will be expended in the city of Nanking in a complete reorganization of the local system, including $100,000 for new buildings, $150,000 for interior and $150,000 for exterior equipment. It is understood that the exterior materials are being purchased through the Sino-Japanese Electric Co., and the interior materials from a Chinese-American Company. The service between Nanking and Pukow, located across the Yangtze River, is also being extended. The submarine cable with only two wires, which now connects these two cities, will be replaced by a new cable providing for 26 wires.

TRAMWAY

Harbin Tramways to be Taken up by Americans.—According to report from Harbin, the Chinese authorities will yield the right of laying tramways in Harbin to American capitalists who are now busily engaged in organizing a company ready to carry out the work.

Extension of Tokyo Line.—Tokyo city will extend the street car line from Narihira to Tamanoe, Honjo-ku.

The Nankai Railway Company has received necessary permission to proceed with the construction of a tramline between the west gate of Tennoji and Abeno bridge, Osaka.

A New Tramlime, Japan.—The Dai Yusan Tram-car Co., Ltd. has received permission to construct a 5.4 miles line between Odawara and Ashigara, Kanagawa prefecture.

The Ideu Tram-car Company has received government permission to construct a line between Tsinnai and Aushinnai, Oita prefecture, at a cost of Y.275,000.

TRANSPORTATION

Transportation Co., Hankow.—The Railway Transportation Trust Co. of Hankow is being organized with a capital of Tls. 2,000,000 to be divided into 20,000 of Tls. 100 each. Branch offices will be established at important places of China.

WATERWORKS

New Waterworks, Chungking.—Mr. Chen Soo-yung has again proposed the organization of a waterworks company at Chungking which was once taken up some time ago and dropped owing to lack of funds. Pumping machines have been ordered from Shanghai.

Chefoo Waterworks.—According to report from Chefoo, Mr. Stephen (translated according to pronunciation of Chinese characters), an American engineer, has applied to the Chinese officials and chamber of commerce of the port, for a concession to establish the Chefoo Waterworks Co., proposed for some time, at a cost of $200,000 to be repaid to him by the chamber of commerce in installments within twenty years.

Artesian Wells, Ningpo.—In view of the recent great fire in Ningpo, the merchants' union has decided to bore two wells at Tung-dien-mye and Nee-ching-mye respectively.

WIRELESS

Wireless for Kashgar.—A party of engineers era being sent from Peking to install a wireless station at Kashgar, establishing communication with Ulumutsi and Peking.

Well-Water Supplying Co. Established, Sungkiang.—The Kan Chien Well-water Supplying Co. has been established in Sungkiang by Mr. Hsu Hsih-tze, a local gentry, with a capital of $10,000. Many deep wells have to be bored by new methods from which pure water is obtained, and Mr. Wu Hsuan-foong, an expert in this particular work, has been employed.

Sino-American Wireless Contract.—With regard to the Sino-American wireless contract, the Federated Wireless Telegraphy Company has planned to establish six wireless stations at Shanghai, each having a height of 1,006 feet and one at Peking, Canton and Harbin respectively each with a height of 626 feet. It is reported that the American engineer has arrived in China and that the construction work is to be finished within eighteen months.

A British Loan Reported.—It is reported that the Peking government has signed a contract with Marconi Telegraph Co. for a loan amounting to £200,000 sterling for establishment of wireless stations at Lasai in Tibet, Lanchow in Kansu and Partung and Chungking in Szechuan. The terms of the loan are reported to be exactly the same as last wireless loan concluded in 1918.